TECHNOLOGY DEPT.

APRIL 1951

The Paper Industry

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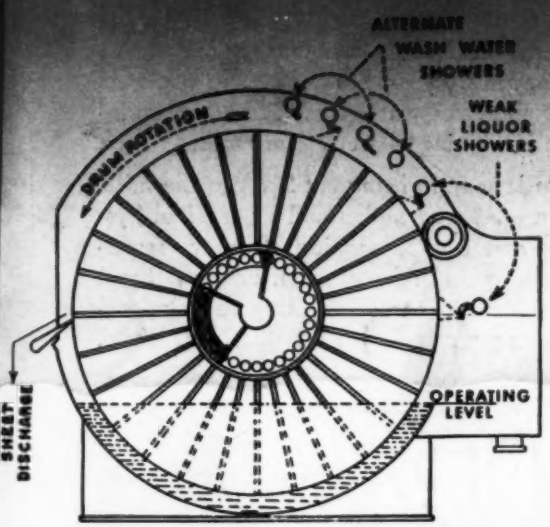
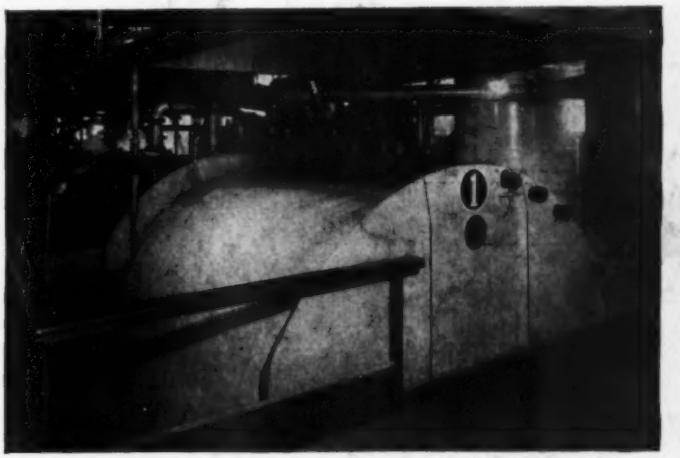
DETROIT

Washes Sulfite Pulp – 2 stages on 1 drum

SWENSON-NYMAN PULP WASHER





Swenson-Nyman Pulp Washers of the type used for sulfite pulp

The diagram at left illustrates a sectional view of a Swenson-Nyman Pulp Washer, and the valve arrangement for maintaining separation of strong and weak sulfite liquors. Pulp emerges well washed at high consistency; with less dilution, thus reducing evaporation costs.

Swenson Spray Dryer converts sulfite liquor to dry powder in 30 seconds. Information on request.

SEND FOR BULLETIN E-108

SWENSON
REG. U. S. PAT. OFF.
SWENSON EVAPORATOR COMPANY
DIVISION OF WHITING CORPORATION
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BIRMINGHAM 3: American Life Bldg.
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- Evaporators
- Pulp Washers • Deckers • Filters
- Digester Blow Condensers
- Surface Condensers
- Turpentine Condensers • Causticizers

✓R v.33 April-Sept. 1951

We must not waste our trees!

Arming the free world is a tremendous job. To meet this challenge, America must make the best use of all her resources. Waste and inefficiency must be cut to the bone . . . methods that were "good enough" yesterday won't meet the increased demands of today.

For one thing, if our paper industry is to increase its capacity, we must stop wasting wood. We can't afford outdated pulping methods that send lots of our wood into the sewers or burn it in recovery furnaces. We lose millions of dollars worth of potential paper and board this way every year. In addition, we waste the labor and transportation facilities that are involved in getting the wood to our mills.

These losses are being cut 20% in the mills that use the new Sutherland High Yield Systems, and they're making stronger, faster-draining pulp in the bargain. Let us tell you how to save our trees, make more pulp, and increase your profits with Sutherland. Write.

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continuous beating systems

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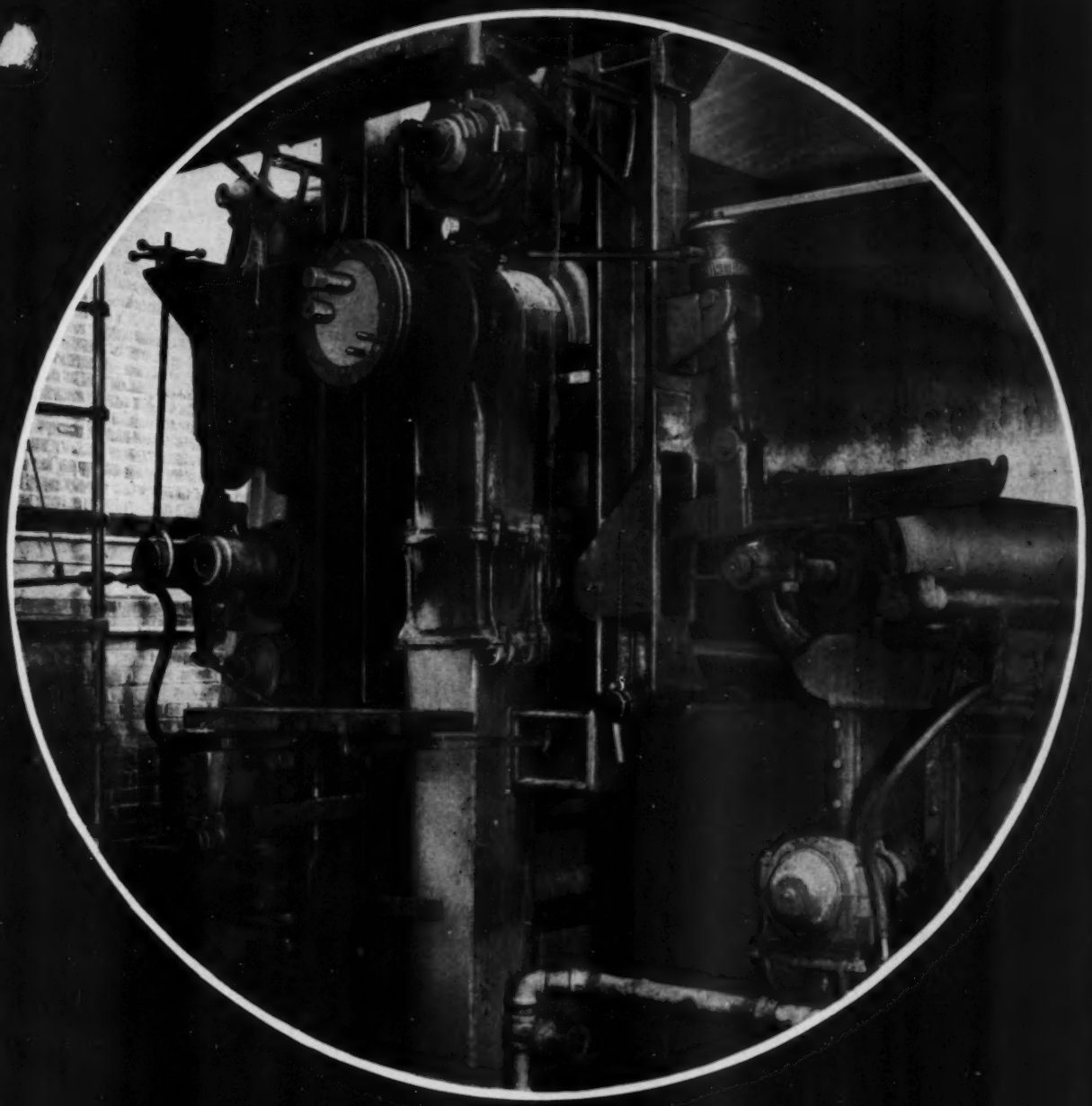
Tech.



Profitable investment for cylinder machines

A Beloit Suction Drum Press results in production increases of 10% to 25%, depending on previous water-removal methods. Sheet quality and strength are improved, bulk can be increased when desired, felt cost per ton of paper is lowered, and checks are sharply reduced. Since the first installation in 1935, mills have reported that the Beloit Suction Drum Press has been "a most profitable investment."

WHEN YOU BUY BELOIT...YOU BUY MORE THAN A MACHINE!

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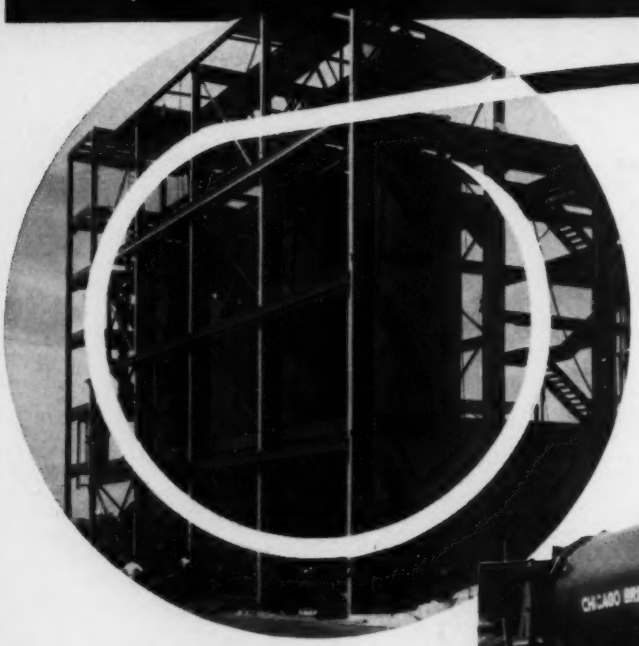
Hudson uses HORTON* digesters



4 in original installation 1947

5 more in 1950 expansion program

During 1950, the Hudson Pulp and Paper Company started to double the capacity of its mill at Palatka, Florida. Five 10-ft. diam. by 33 ft. Horton digesters are important capital equipment items in this $10,000,000 expansion.

Horton digesters are no strangers to the Palatka mill. When the mill was built in 1947, four were installed to provide a total digester capacity of 40 tons of pulp per blow.

This repeat installation is evidence that Chicago Bridge builds good structures for pulp mills.

Besides digesters, the Horton line includes chip tanks, blow tanks, elevated water tanks, and Marx Savealls for recovery of solids from waste white water. Some of the services we offer the paper industry are . . . x-raying, stress-relieving and welding to exact specifications . . . ability to handle corrosion-resistant materials . . . prompt service due to strategic location of our five plants. May we quote on *your* next job?

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BULLETIN NO. 250

Are steam traps practical for draining paper machine dryers?

TRUE ☐ FALSE ☐

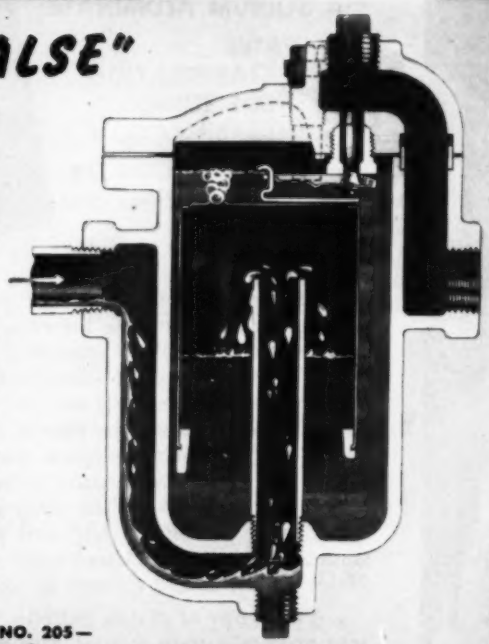
"TRUE" and "FALSE" are both correct

Says Armstrong Bulletin No. 205

. . . SOUNDS like double talk, but it isn't. Armstrong has discovered some important new facts about steam traps and dryer drainage.

Traps have quite generally not been satisfactory and many mills have been forced to use substitutes. But recent studies and field tests *prove* that it is possible to build a trap that will give superior performance on dryer drainage. Superior from the standpoint of long, long life . . . and superior from the standpoint of condensate drainage and air venting. Inefficient and expensive substitutes for traps are no longer necessary!

SEND FOR YOUR COPY OF BULLETIN NO. 205 — it tells the story completely. It is interesting, educational and factual . . . Write today.



ARMSTRONG NO. 813-D Paper Machine Dryer Trap — NEW and BETTER! Bulletin No. 205 explains the difference between this trap and other traps, including the *standard* Armstrong Steam Trap.

ARMSTRONG MACHINE WORKS
820 Hoffman Street • Three Rivers, Michigan

Your Copy is Ready!

Nalco
BULLETIN 55

Condensed Data on:

- SLIME CONTROL
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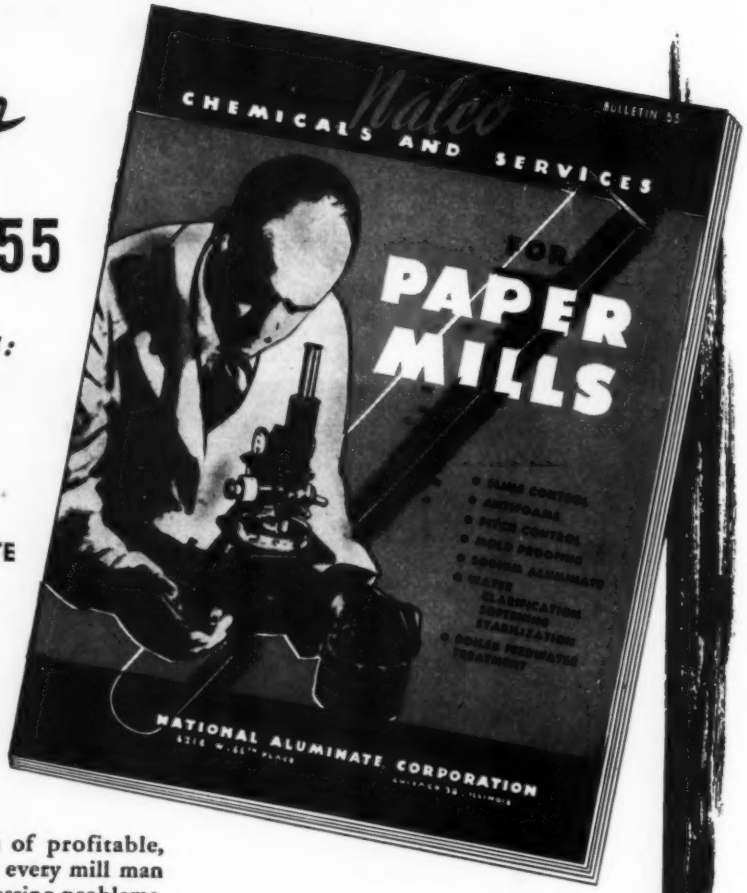
- PITCH CONTROL
- MOLD PROOFING
- SODIUM ALUMINATE
- WATER
  CLARIFICATION
  SOFTENING
  STABILIZATION
- BOILER FEEDWATER TREATMENT



HERE are twenty pages of profitable, educational reading for every mill man concerned with chemical processing problems. In addition to compact information on the principal Nalco chemicals and services listed above, there are numerous photos and microphotos of typical microbiological troublemakers in mill systems . . . a big section giving detailed answers to over 75 of the most commonly asked questions about pulp and paper mill slime control . . . and factual users' reports on Nalco chemicals and services in action.

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The Paper Industry

Technology • Engineering • Management • Production

VOLUME 33 • NUMBER 1 • APRIL, 1951

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for UNIFORM PENETRATION

of adhesive in corrugated paperboard

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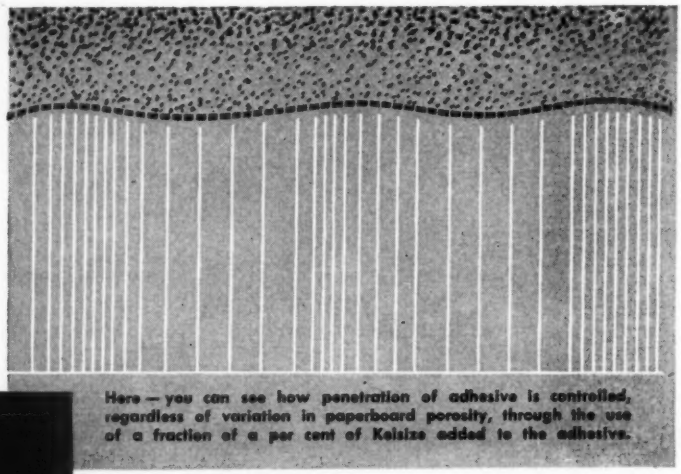
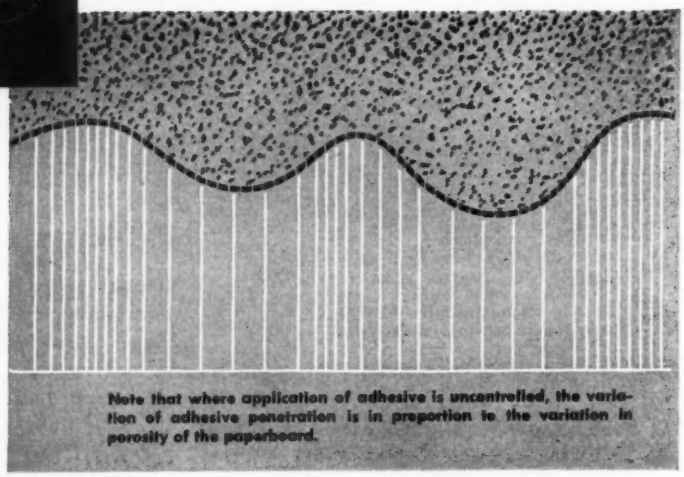
Kelsize



Here — you can see how penetration of adhesive is controlled, regardless of variation in paperboard porosity, through the use of a fraction of a per cent of Kelsize added to the adhesive.

Here are representative cross sections of a sheet of paperboard showing variation of both internal and surface porosity.



Note that where application of adhesive is uncontrolled, the variation of adhesive penetration is in proportion to the variation in porosity of the paperboard.

KELSIZE...
gives these advantages

- Less adhesive used . . . less moisture to remove
- Reduced warping . . . stiffer board
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- Adhesive where you want it . . . where it's needed

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Units now in operation have from 2 to 8 tubes, and are handling up to 100 tons a day of wood chips dry basis.

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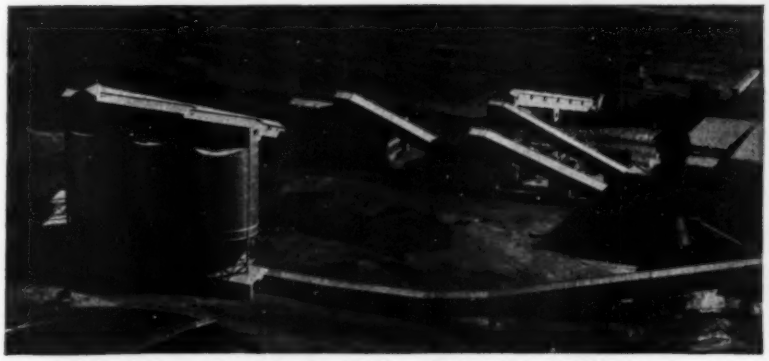
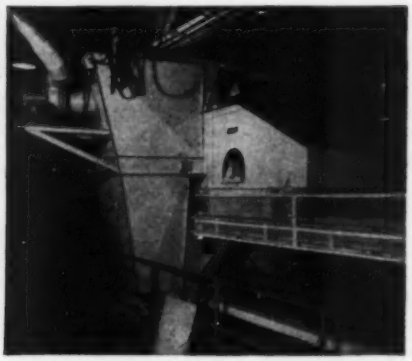
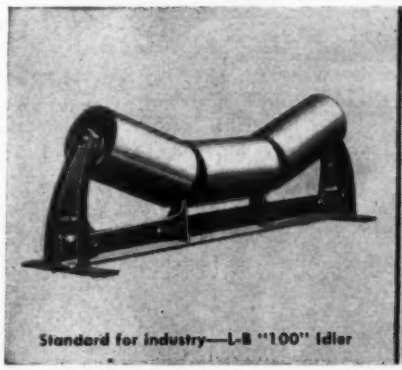


Modern pulp mill equipped with reliable, efficient Link-Belt Feeders and Belt Conveyors.

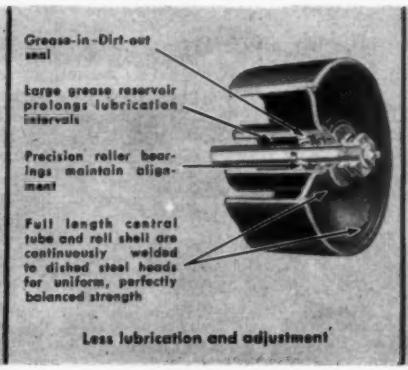


Link-Belt Conveyor and Traveling Tripper handling 240 tons of wood chips per hour.

LINK-BELT quality components...



Standard for industry—L-B "100" Idler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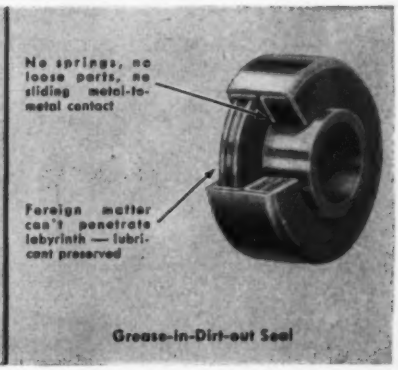
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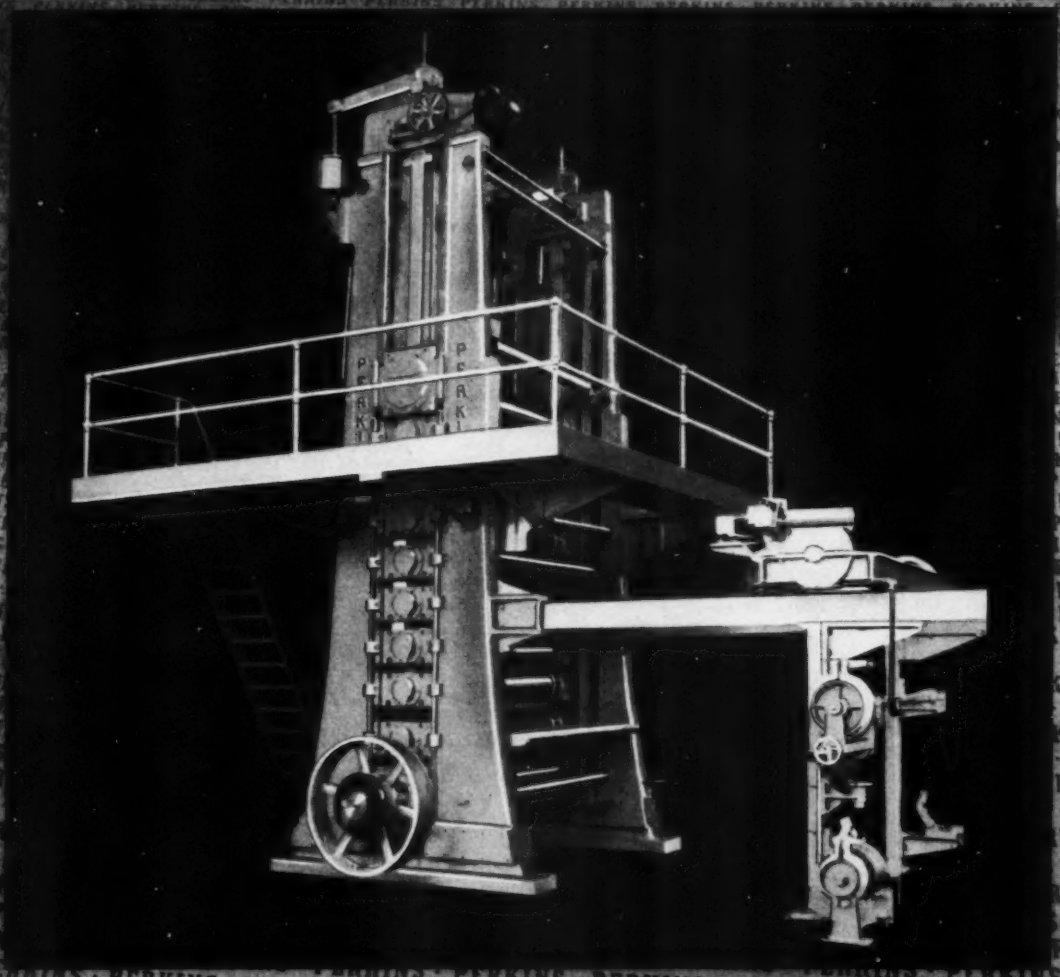

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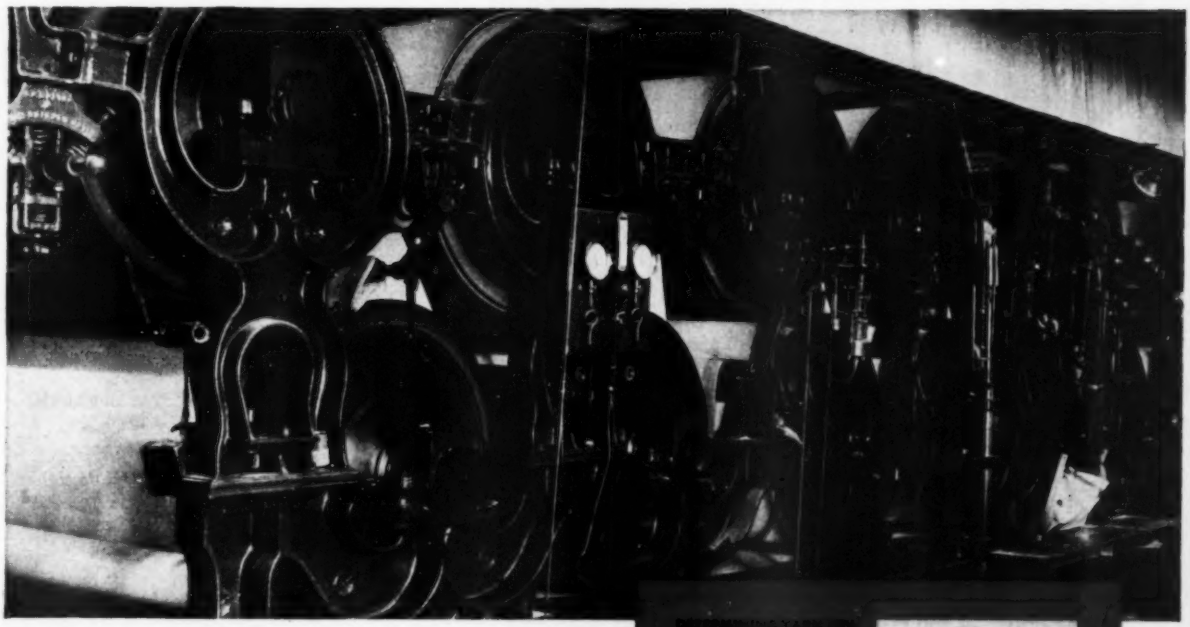

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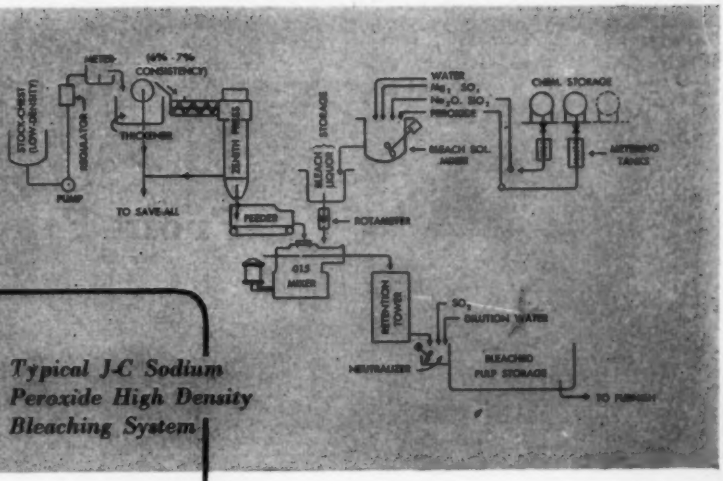
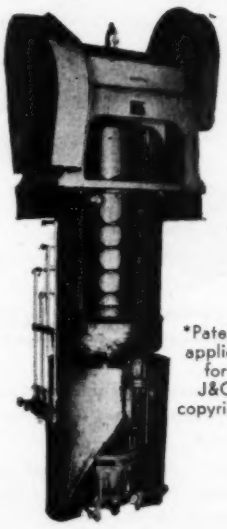
Jackson and Church — HIGH DENSITY SYSTEM



Typical J-C Sodium Peroxide High Density Bleaching System

USES *NO MORE* PEROXIDE TO BLEACH *HIGHER* TONNAGE TO *SAME* BRIGHTNESS OR— *SAME* TONNAGE TO *HIGHER* BRIGHTNESS



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J&C Zenith Press designed for use in high density systems, and in pulp washing, de-inking and storage at high density.

The J&C High Density System makes possible bleach consumption savings up to 25%

HERE ARE ADDITIONAL ADVANTAGES:

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- Continuous operation
- Fully automatic operation
- Selective pressure control
- Product of uniform consistency
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For engineering assistance and actual mill performance data, write Dept. D.

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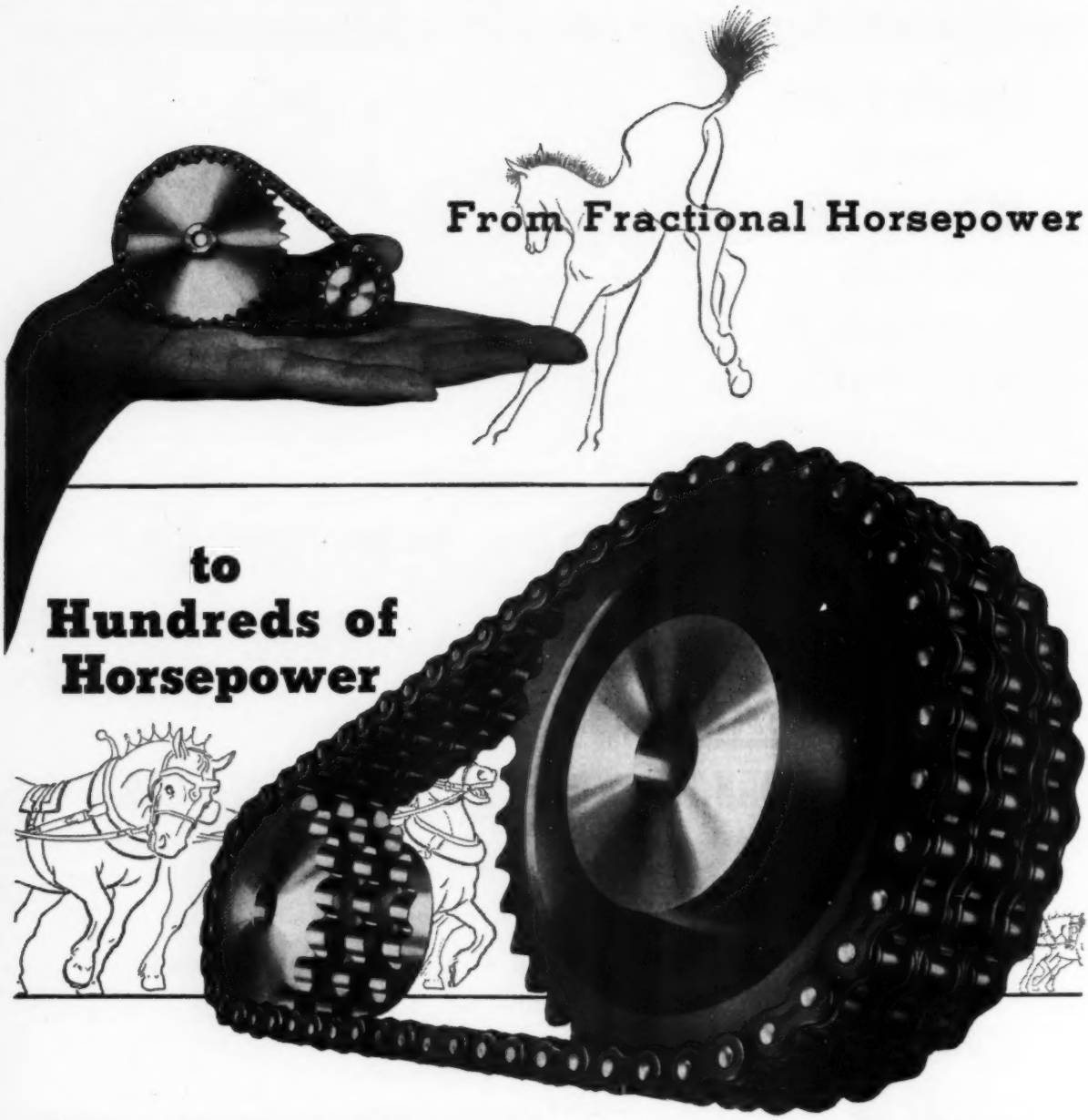

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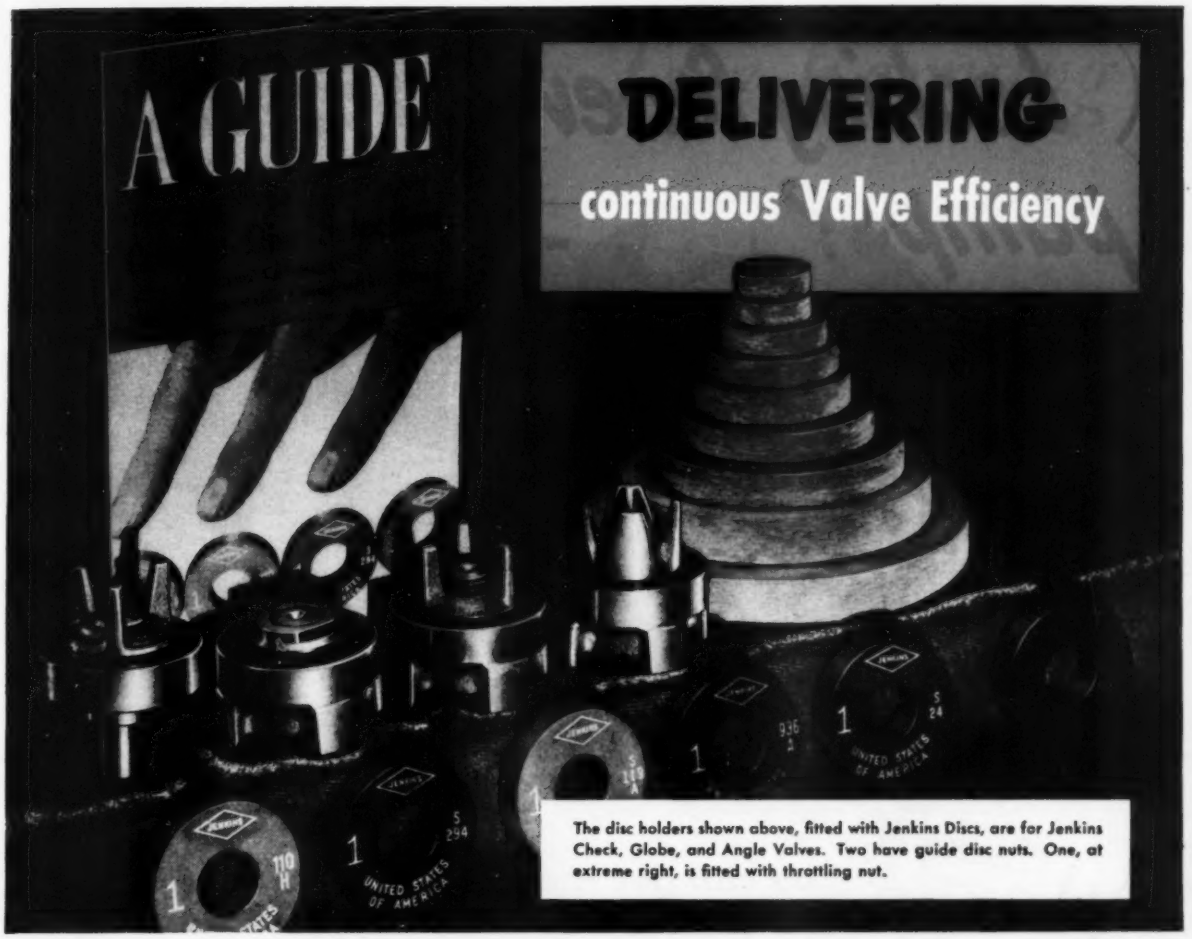
And what's more, these adaptable drives offer opportunities for important cost reductions and improved performance. *For example* — Whitney Chain Drives operate equally well on long or short centers. They will drive single or multiple shafts, provide accurate timing or reversal of direction. Standard attachments, built into the chain, offer still more opportunities for economical application possibilities.

And remember, Whitney Chains . . . *the all-steel drives* . . . deliver *full rated* power, smoothly and dependably. Their positive grip transmits constant, uniform speed. They are easily and quickly installed, reducing costly down time. No removal of shafts or bearings necessary. Alloy steel construction assures maximum service with minimum maintenance.

WHITNEY ENGINEERING SERVICE — In addition to the service facilities of more than 130 Distributors, Whitney maintains a network of 15 Field Engineering Offices, located throughout the country. From the complete line of Roller, Silent and Conveyor chains, Whitney engineers can recommend the proper type of drive for your application . . . the chain drive which will give you the best service at lowest cost. Consult your nearest Whitney field office or write us direct for catalog and complete information.

WHITNEY CHAIN COMPANY

236 Hamilton Street, Hartford 2, Connecticut


A GUIDE
DELIVERING
continuous Valve Efficiency
The disc holders shown above, fitted with Jenkins Discs, are for Jenkins Check, Globe, and Angle Valves. Two have guide disc nuts. One, at extreme right, is fitted with throttling nut.

Now, when *continuous valve efficiency* is vital . . . you can rely on readily available Jenkins Renewable Composition Discs to provide the valve protection that greatly extends service life. Proper disc selection and replacement in time guard against premature wear, can multiply the original efficiency of valves many times over.

Disc replacement is simple and easy, can be done without removing valves from the line. To save more time, maintenance-wise valve users keep on hand a stock of disc holders fitted with the discs most commonly used.

Money-saving idea
for disc-valve maintenance

Keep on hand a stock of disc holders fitted with the discs most commonly used. This permits quick replacements, saves valuable time.

Slip off the disc holder with the old disc, and slip on another containing the new disc.
When you have time, reload the old disc holder with a new disc.

Only Jenkins makes *both* Valves and Discs

Originator of the first successful Renewable Composition Disc, Jenkins Bros. has continued to set quality standards. That's why you can rely on your Jenkins Distributor for discs of time-tested design and composition, plus authoritative disc information.

Ask your Jenkins Distributor for the folder, "A Guide to Correct Disc Selection" . . . also the "Jenkins Disc Selector", a handy wall chart listing recommended discs for all common services, temperatures, and pressures. Or write Jenkins Bros., 100 Park Ave., New York 17. Jenkins Bros., Ltd., Montreal.

Sold through leading Industrial Distributors everywhere

JENKINS
LOOK FOR THE DIAMOND MARK
VALVES
SINCE 1864
TRADE JENKINS MARK

Jenkins Bros

Looking for evaporator pumps?

Worthite pump handling distillery slop.

A battery of Worthites pumping black liquor in a soda pulp plant.

You can get the best in Worthington Worthite Centrifugal Pumps

By standardizing on a complete range of sizes in one superior stainless steel, Worthington can concentrate its volume and inventories. This means you can get the centrifugal pump and parts you need for handling corrosive liquids and other chemicals. Thousands of these Worthington *standard* pumps are now in evaporator service, pumping such widely varying liquids as black liquor, ammonium sulfate and frozen orange concentrate. Their advanced design and exceptional resistance to abrasion and corrosion assure best results at lowest operating cost.

FOR ALL EVAPORATOR SERVICES

Worthington has evolved a scientific method of selecting exactly the right pump for size, speed, head, capacity and NPSH. Let us show you how it works. For further facts proving *there's more worth in Worthington*, call your nearest District Office. Or write to *Worthington Pump and Machinery Corporation, Centrifugal Pump Division, Harrison, N. J.*

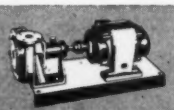
TYPICAL LEADING MANUFACTURERS OF EVAPORATOR SYSTEMS USING WORTHITE PUMPS

Buflovak • General American Transportation
Goslin Birmingham • Koppers
Mojonnier Brothers • Struthers Wells
Swenson • Wilputte • Zaremba

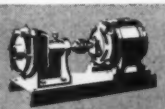
WORTHINGTON

C1-E

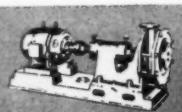
THE WORLD'S BROADEST LINE ASSURES YOU THE RIGHT PUMP FOR EVERY JOB



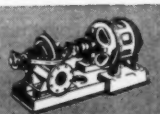
Type CG and CGL. Sizes ¾" to 10". Capacities to 5000 GPM; heads to 200 ft. Liquid ends of WORTHITE alloy.



Type CF. Sizes 1" to 4". Capacities to 1000 GPM; heads to 130 ft. Standard, all iron and all bronze.



Type CQ. Sizes 1½" to 3". Capacities to 600 GPM; heads to 130 ft. at 1750 RPM. Closed impeller. WORTHITE shaft and fittings.



Type L. Sizes 3" to 8". Capacities to 2250 GPM; heads to 300 ft. Single stage volute. For general service.

...this is Tree Farming

Seed Blocks Restock Cutover Land

Hand Planting on Burnt-Over Areas

Young Second Growth on a Tree Farm

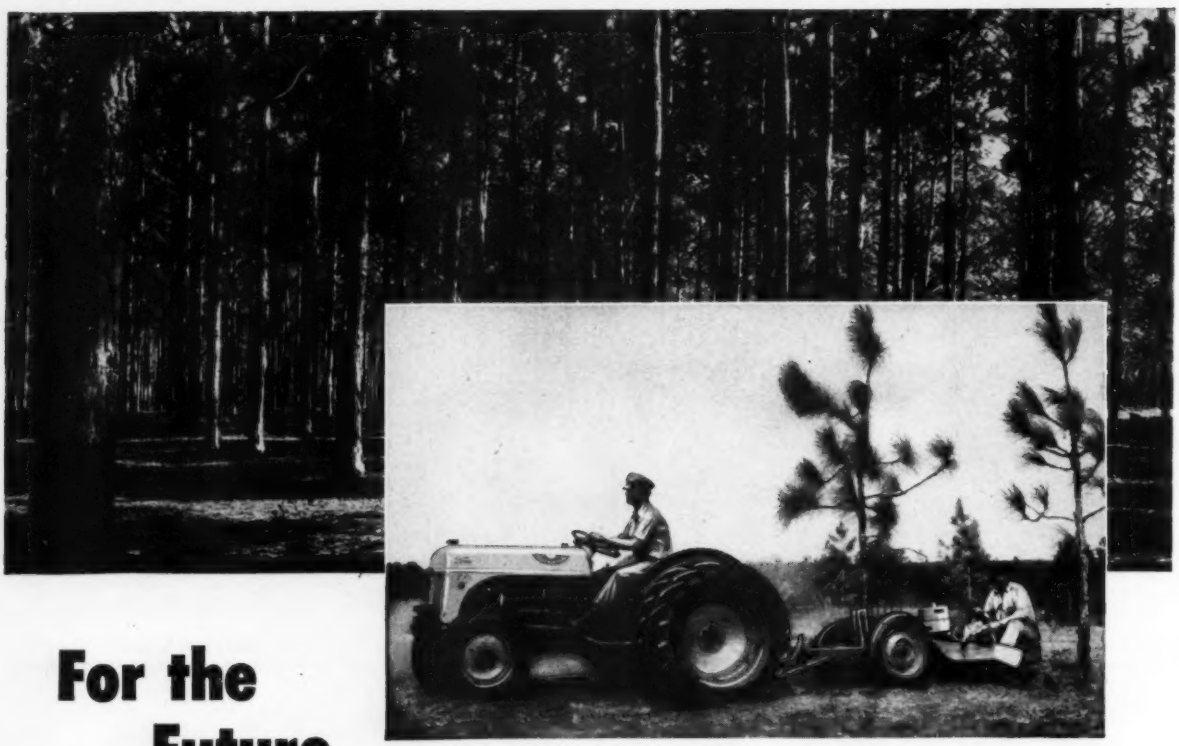
Spotter Plotting a Fire Location

A forest is not like an oil well or a mine... consisting only of a given amount of irreplaceable material. Forests are *living things*... and given a fair chance will reproduce themselves, barring complete destruction of the seed source. In fact, for years it has been a Weyerhaeuser tenet that..."Man cooperating with nature can provide a new forest as good or better than the original." To further implement this basic concept of forest management, Weyerhaeuser has joined others in the forest industry in establishing over two million acres of certified tree farms in Oregon and Washington.

The Pulp Division, Weyerhaeuser Timber Company, will benefit from this enlightened cooperative forest management program through a guaranteed source of supply for its sulphite and sulphate pulp mills.

WEYERHAEUSER

DETROIT PUBLIC LIBRARY



Planting slash pine seedlings by machine in an open area.

For the Future

The seedlings planted by St. Regis each year are insurance that basic raw material for the Company's pulp, paper, board, bags and plastics will continue to be available.

Serving important segments of American industry—meeting diversified requirements for war or peace—St. Regis plants, factories and people are producing and expanding . . . with confidence in future demand and assurance of future raw material supply.

SUMMARY OF CONSOLIDATED INCOME

For the Years Ended December 31, 1950 and 1949.

	1950	*1949*
Net Sales, Royalties, and Rentals	$154,789,186	$127,335,591
Cost of Sales and Expenses	$134,376,511	$118,719,146
Operating Income	$ 20,412,675	$ 8,616,445
Income Credits	$ 1,362,283	$ 992,916
Gross Income	$ 21,774,958	$ 9,609,361
Income Charges	$ 1,626,088	$ 1,542,833
Net Income Before Provision for Federal and Foreign Taxes on Income	$ 20,148,870	$ 8,066,528
Provision for Federal and Foreign Taxes on Income	$ 8,525,126	$ 2,588,325
Net Income	$ 11,623,744	$ 5,478,203
Dividends Paid		
Preferred Stock	$ 752,105	$ 798,575
Common Stock	$ 3,619,500	$ 3,102,428

ST. REGIS PAPER COMPANY

230 PARK AVENUE, NEW YORK 17, N. Y.

Offices in Principal Cities—In Canada: St. Regis Paper Co. (Can.) Ltd., Montreal

Need small lots of seamless tubing right away?

These two wear-resistant TIMKEN® steels will do 90% of your hollow parts jobs

WHEN you've a rush job on your hands, these two general purpose Timken® steels can be shipped to you in warehouse quantities within 24 hours after your order is received! With these two steels—52100 and "Nickel-Moly"—you can do 9 out of 10 of your hollow parts jobs. Both offer good hardenability and wear resistance.

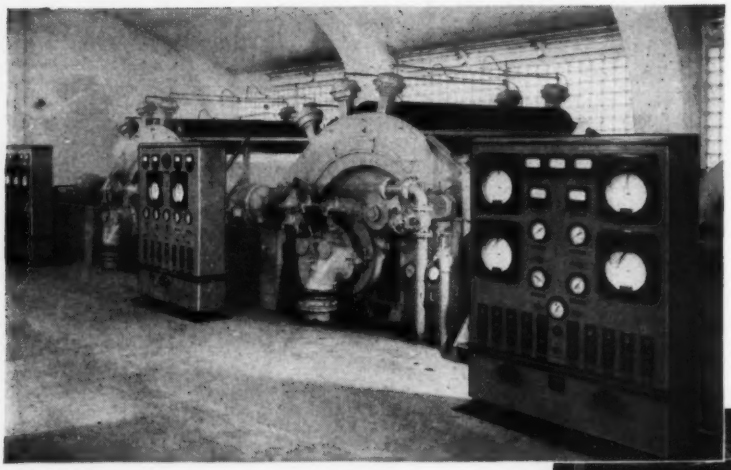
52100 steel, frequently substituted for costlier grades, can be heat treated to file hardness and tempered back to any desired point. In moderate sections it has through hardenability. "Nickel-Moly" is a fine-grained, carburizing steel that develops high case-hardness and a tough inner-core when heat treated, giving it exceptional stamina and shock-absorbing qualities.

52100 tubing is available from the Timken Company in 101 sizes, from 1″ to 10½″ O.D. And "Nickel-Moly" comes in 52 sizes, from 1⅜″ to 10¼″ O.D.

No matter which of these two Timken steels you order, you can be sure of uniform, high quality in every tube—and in every shipment. That's because every step of manufacture is rigidly and carefully controlled—from melting to final testing. Write for stock lists with the latest information on available sizes, grades and finishes. The Timken Roller Bearing Company, Steel and Tube Division, Canton 6, Ohio. Cable address: "TIMROSCO".

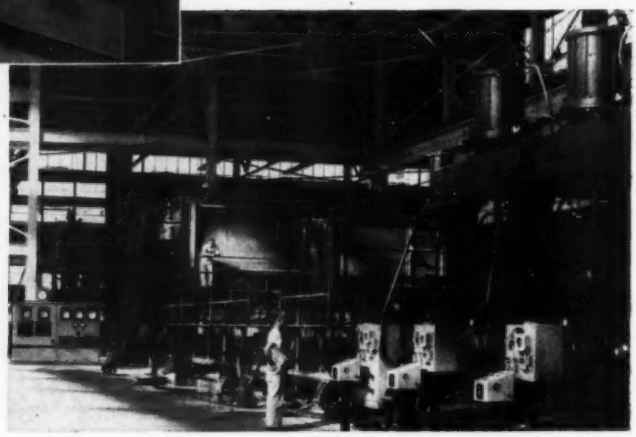
YEARS AHEAD—THROUGH EXPERIENCE AND RESEARCH

Specialists in alloy steel—including hot rolled and cold finished alloy steel bars—a complete range of stainless, graphitic and standard tool analyses—and alloy and stainless seamless steel tubing.



pH control in your bleach plant will improve quality and save chemicals.

pH control on your paper machine will improve and maintain quality and permit higher machine speeds.



Better Mill operation... Better finished product...

with Foxboro pH Measurement and Control Systems

Wherever pH is an important factor in your process, automatic measurement or control by Foxboro instrumentation can bring big improvements in results. It means brighter pulp in bleaching with minimum chemical usage . . . better quality paper at higher machine speeds . . . more reliable machine operation . . . or any of a number of other advantages.

BASED ON DYNALOG ELECTRONIC INSTRUMENTS

Designed with the Foxboro Dynalog* as the basic instrument, Foxboro pH systems take full advantage of the greater sensitivity and reliability of electronic circuits. The Dynalog provides flawless, *stepless*, continuous measurement or control through use of a simple variable capacitor. It has no slidewire, no batteries to standardize, no high-speed motor, gears or galvanometer. Maintenance is eliminated, except for occasional replacement of standard radio tubes. Available in recording or recording-controlling models.

Beckman glass electrodes are the primary measuring elements of Dynalog pH systems. They are suitable for use in nearly all types of liquids, regardless of color, viscosity, rate of flow, suspended solids, oxidizing or reducing agents.

WRITE FOR COMPLETE INFORMATION

Whatever your requirements, there is a Foxboro Dynalog pH System to meet them. Consult your nearest Foxboro representative — or write for Bulletin 430. **The Foxboro Company, 1584 Neponset Ave., Foxboro, Mass., U.S.A.** Branch offices in principal cities.

*Reg. U. S. Pat. Off.

FOXBORO
REG. U. S. PAT. OFF.

RECORDING · CONTROLLING · INDICATING
INSTRUMENTS

IN FLOW CONTROL EQUIPMENT, *the* BEST *is not too good for you*

Why not take advantage of Powell "know-how" in design, workmanship, and *use of materials*?

The Complete Line includes valves in Bronze, Iron, Steel and the widest selection of Corrosion-Resisting metals and alloys ever made available to Industry.

Quality fine throughout "The Line"

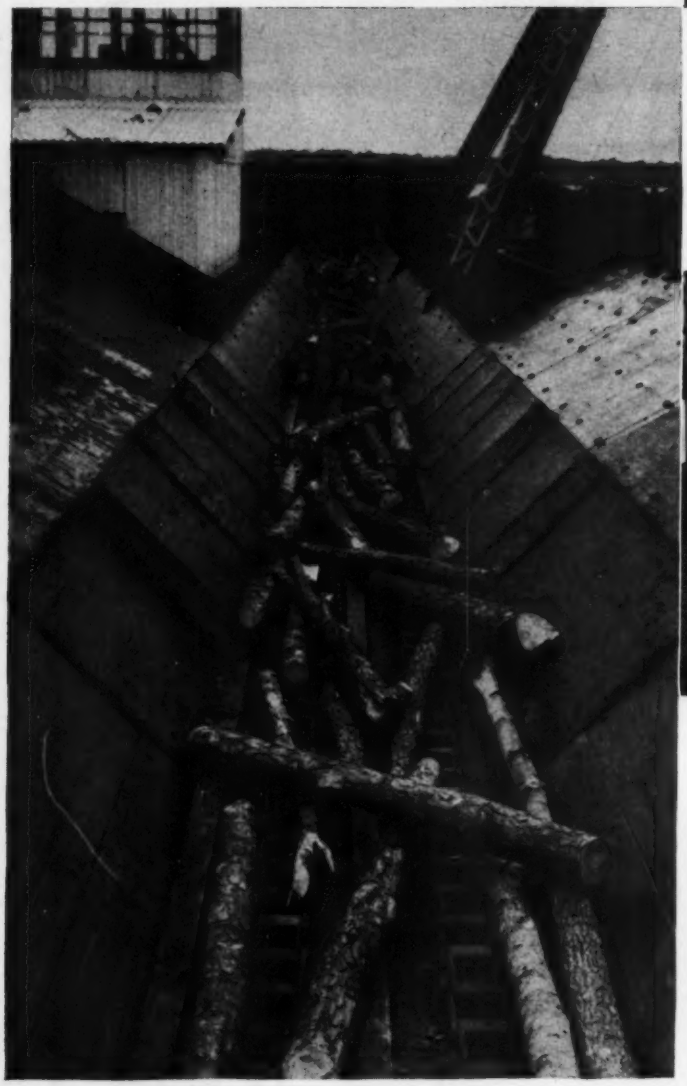
Fig. 2453 G—Large 150-pound Stainless Steel O. S. & Y. Gate Valve. Also available in many other Corrosion-resisting Metals and Alloys. All the dimensions of flanged end valves conform to MSS Standard SP-42.

POWELL

The WM. POWELL CO., 2525 Spring Grove Ave., P. O. Box 106, Station B, Cincinnati 22, Ohio

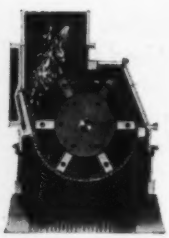
PAPER IS ESSENTIAL

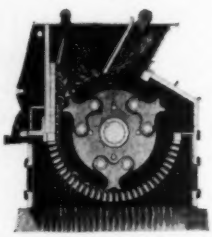
without it we wouldn't be writing to tell you that . .



Jeffrey builds quite a lot of equipment used in paper making. We begin with pulpwood handling and follow through each step of the process to the finished paper rolls (see list below). Many companies are cutting costs, speeding production and otherwise running more smoothly because of Jeffrey equipment. We can help you . . . write us today.

A Jeffrey Belt Conveyor handling chips (above). Chain Conveyor handling pulpwood at the left.





Crushers, pulverizers and shredders for reducing wood, chips, salt cake, pulp lap, etc.

Belt Conveyors **Chain Conveyors** **Log Haul-ups** **Crushers**
Unloaders (Barge) **Re-chippers** **Grinders** **Bucket Elevators**
Chemical Feeders **Transmission Machinery** **Spiral Conveyors**

THE JEFFREY MANUFACTURING COMPANY Established 1877

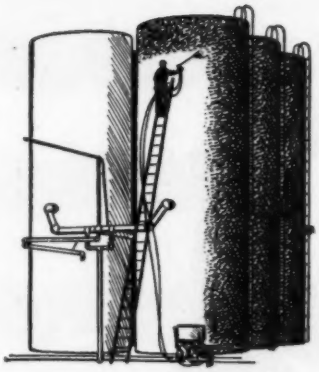
944 North Fourth St., Columbus 16, Ohio

Complete Line of Material Handling, Processing and Mining Equipment

JM

Baltimore 2 Boston 16 Cincinnati 2 Detroit 13 Jacksonville 2 Philadelphia 3 Salt Lake City 1
Beckley, W. Va. Buffalo 2 Cleveland 15 Harlan, Ky. Milwaukee 2 Pittsburgh 22 Scranton 3
Birmingham 3 Chicago 1 Denver 2 Houston 2 New York 7 St. Louis 1

Jeffrey Mfg. Co. Ltd., Montreal, Canada
Jeffrey-Galion (Pty.) Ltd., Johannesburg, S.A.
The Ohio Malleable Iron Co., Columbus, Ohio
British Jeffrey-Diamond Ltd., Wakefield, England
The Galion Iron Works & Mfg. Co., Galion, Ohio
The Kilbourne & Jacobs Mfg. Co., Columbus, Ohio

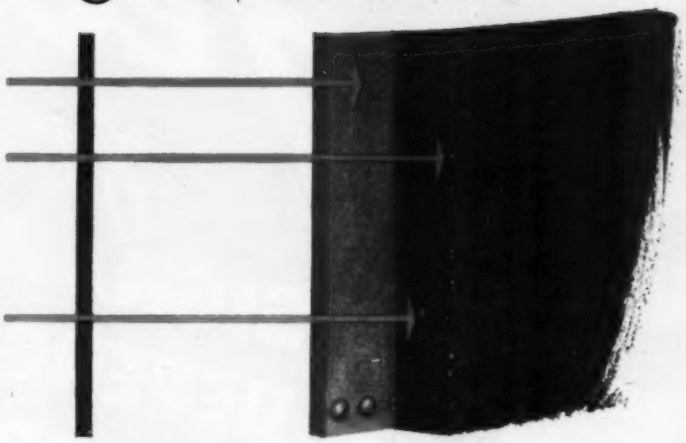


one coat of **Insul-Mastic** type "D"

prevents

- ✓ corrosion
- ✓ heat loss
- ✓ condensation

- Surface to be coated and insulated.
- Insul-Mastic Coating, with its high Gilsonite content, prevents corrosion by stopping moisture, acids, alkalis and salts from contacting the surface under the coating.
- Granulated cork, in large amounts, insulates the vessel. Up to 65% of heat loss can be prevented or condensation can be controlled with a ¼" application.



Insul-Mastic Type D insulation requires no vaporseal or further protection. It will not absorb moisture and thus will retain full insulating efficiency throughout its life. As an insulation, it has a K factor of .36 which is approximate to that of cork board. Insul-Mastic Type D is spray applied and will adhere at any angle without mechanical support. Type D can be used on surfaces having a temperature range from minus 40° F., to plus 300° F., without deterioration.

Insul-Mastic Type D has been used to prevent heat loss on oil storage tanks, paper pulp digesters, liquid sugar tanks, warm air ducts, prefabricated metal buildings and many other types of equipment, piping, etc. It controls condensation on cold water intake pipes for boilers, in railroad freight cars, on building panels, corrugated metal roofs, and cold air ducts, etc.

Write for our booklet, "INSUL-MASTIC TYPE D INSULATION" and for the name of your nearest Insul-Mastic representative.

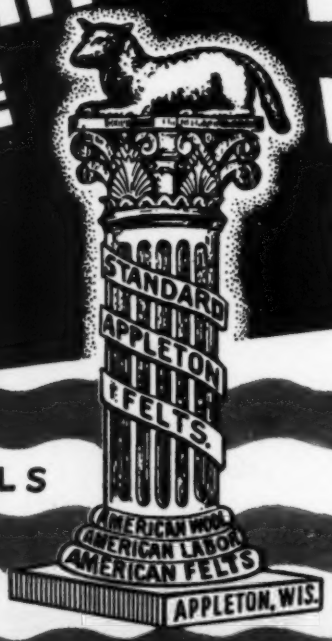
Think first of the coatings that last!

Insul-Mastic Corporation
OF AMERICA
1157 OLIVER BUILDING · PITTSBURGH 22, PA.
Representatives in Principal Cities

APPLETON *Felts*

for

DESIGN *AND* FINISH
— DEPENDABILITY
— UNIFORMITY
— SERVICE



APPLETON WOOLEN MILLS

APPLETON, WISCONSIN

for high efficiency in bleaching

• • • You get whiter, better pulps and papers with BECCO bleaching processes.

BECCO processes have been developed to make the most efficient use of the bleaching qualities of BECCO Hydrogen Peroxide. BECCO Hydrogen Peroxide 50% is a safe, mild, fully effective bleaching agent.

Years of research, years of successful field experience with users of BECCO processes and BECCO Peroxygen chemicals . . . laboratory and pilot plant facilities at our plant in Buffalo . . . make BECCO a leader in the field of pulp bleaching.

Important to you . . . the active cooperation of BECCO representatives . . . specialists in pulp bleaching processes. Let us know if they can be of help.

use BECCO bleaching processes

Among users of BECCO Peroxygen Chemicals and BECCO bleaching processes are: St. Regis Paper Co., Escanaba Paper Co., Diamond Match Co., Blandin Paper Co., Finch, Pruyn & Co., Inc., Westminster Paper Co., Ltd.

BECCO SALES CORPORATION
Sales Agent for Buffalo Electro-Chemical Company, Inc., Buffalo 7, N. Y.

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(P-1).....Pulp Bleaching with Hydrogen Peroxide
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Name.....Title.....

Company.....

Address.....

City.....Zone.....State..... PI-4-51

WHY *Kalamazoo* TILE TANKS ARE YOUR BEST INVESTMENT

An old chest may be made as clean and shining as this with *Kalamazoo* tile lining.

● **SMOOTH SURFACES** Unusually free-flowing, easily cleaned, not affected by ordinary stock fluids.

● **EXTRA STRONG** *Kalamazoo* Tile Tanks may be designed for any load or pressure or even as part of building.

● **DURABLE** The first *Kalamazoo* Tile Tanks installed over 20 years ago show no signs of deterioration today.

● **ECONOMICAL** For most installations, *Kalamazoo* Tile Tanks cost no more than reinforced concrete, last far longer.

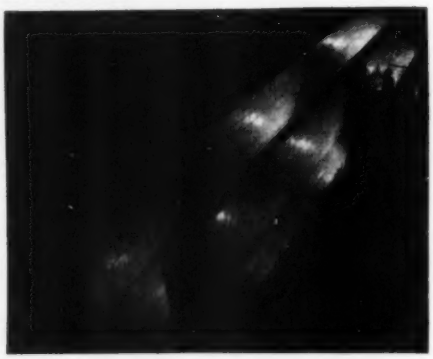
● **MINIMUM MAINTENANCE** No chipped concrete to repair, no slime to remove, no rusted metal, no tightening of hoops.

● **"PIONEER" CONSTRUCTION** Over 20 years ago *Kalamazoo* engineers pioneered in designing and building vitrified glazed tile tanks — the standard of quality today in the paper industry.

•

***Kalamazoo* tile is made in all shapes necessary for original construction or conversion of any type tank, chest, or storage building. A single contract covers *Kalamazoo* engineering and construction service, giving you the protection of undivided responsibility. On any tank problem, write or call *Kalamazoo* first.**

Cylindrical *Kalamazoo* tile tank.



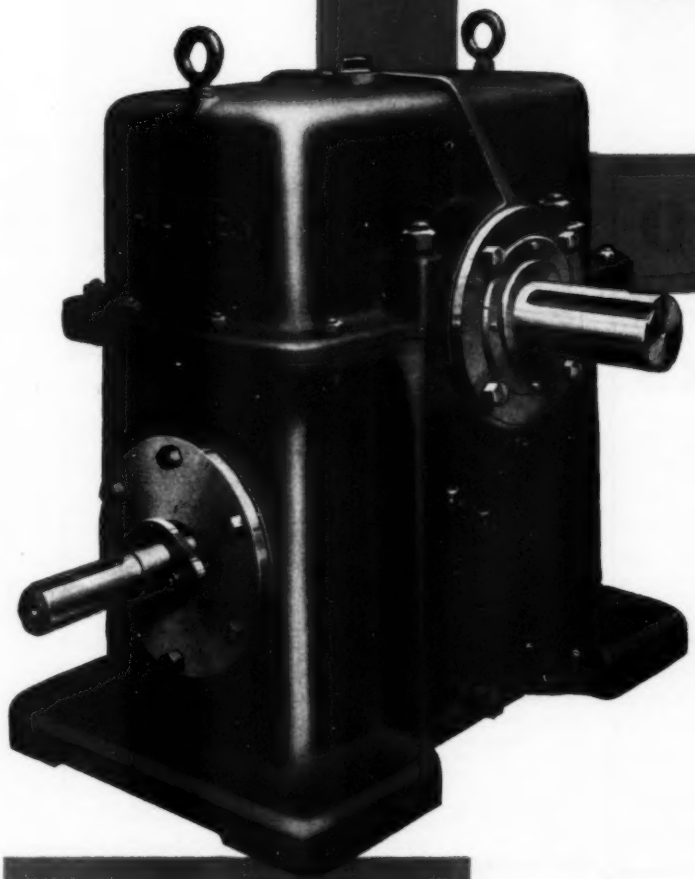
Kalamazoo Tile circulating chest ready for installation of concrete cover slab for support of equipment.

***Kalamazoo* TANK and SILO COMPANY**

427 HARRISON STREET • KALAMAZOO, MICHIGAN

Jones

WORM GEAR SPEED REDUCERS

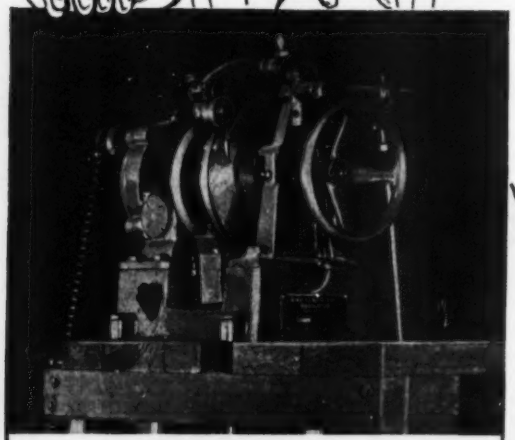


A right angle unit built for heavy duty performance in any industry. The worm can be above or below the gear. Shafts single or double extended for coupling connections or chain or gear drives.
They are built in ratios from 4 to 1 to 90 to 1 and in capacities from ¼ to 100 H.P.
Bulletin No. 68 covers selection tables and dimensions.

W. A. JONES
FOUNDRY & MACHINE CO.
4439 W. Roosevelt Road
Chicago 24, Ill.

Since 1890
Jones

HERRINGBONE — WORM — SPUR — GEAR SPEED REDUCERS
CAST IRON PULLEYS • CUT GEARS • V-BELT SHEAVES
ANTI-FRICTION PILLOW BLOCKS • FLEXIBLE COUPLINGS



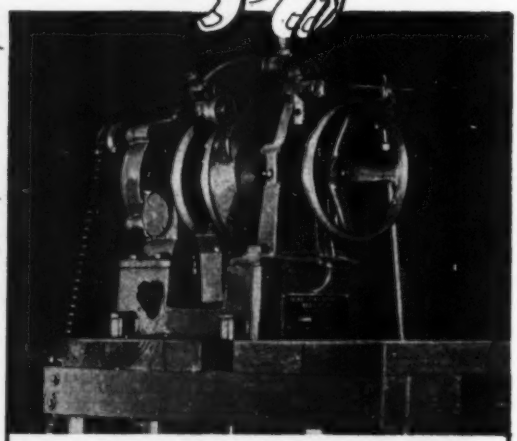
install BIRD CONSISTENCY REGULATORS

wherever strict control of stock consistency means better pulp and paper at lower cost per ton

- ahead of knotters
- ahead of pulp screens
- at thickeners before bleaching
- at pulp drying machines for controlling both consistency and volume
- ahead of brown stock washers

★ ★ ★

- at the Jordans
- at the stuff chests
- at the machine chests
- after centrifugal pumps
- after plunger pumps



install BIRD CONSISTENCY REGULATORS

wherever dependable, automatic, accurate* control of stock consistency is wanted day in and day out. You simply set the Bird Regulator and forget it.

*The Bird Consistency Regulator controls consistency to not more than 0.1% heavier or lighter than desired, whether the stock is less than 1% or as heavy as can be pumped.

For layouts and estimates, get in touch with

BIRD MACHINE COMPANY

SOUTH WALPOLE • MASSACHUSETTS

The Paper Industry

April 1951

Waste Paper Drive

Many organizations throughout the country are pushing waste paper drives. Two basic appeals are behind the movement—one is to make money by selling waste paper while the other is to aid the current mobilization effort.

But we in the paper industry have a third reason for which to get behind the drive. A large segment of the paper and paperboard industry depends on waste paper. In these days of pulp shortages, salvaged paper takes on added significance as a raw material. Over eight million tons of waste paper per year are required to keep our mills at top production.

The nation's products move to their destinations in cartons and packages made from waste paper. More than 700,000 items used by soldiers overseas have paper in them or shipped in paper cartons. Almost every article of food, clothing and supplies, both civilian and military, is dependent on paper for protection and shipping.

Only a few weeks supply of waste paper is now on hand. So now is a good time to clean out that attic and throw out those old office records. Discarded magazines stacked up at home or office can be put back to work. Here is a chance to help out your church, boy scout or other civic or public spirited organizations who collect waste paper and earn money on it. It's also an opportunity to help your own industry by adding to the scarce raw material supply.

Wood Resources In Pacific Northwest

For the past 100 years, since it was first settled by white men, the Pacific Northwest has derived much of its prosperity from its forests. Only in the past three decades, however, have any serious attempts been made to achieve greater utilization of wood resources. The advent of a large scale pulp and paper industry was a chief factor in causing the sawmills to abandon their huge refuse burners that destroyed vast quantities of wood. Continued advances in wood utilization have resulted in many new and valuable products and have eliminated much of this waste.

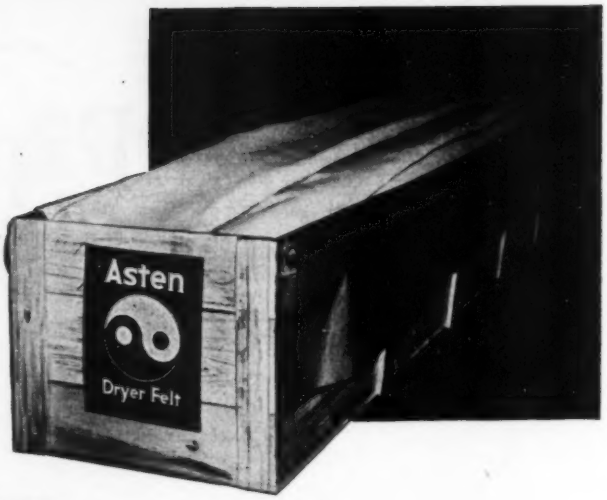
Now comes the State of Washington's Institute of Forest Products with an up to date report on its wood resources. According to this report, nearly 210 million cubic feet of unused or left over wood is available annually. This is equivalent to three million tons of dry wood. Left-over wood, accessible to tide water in the western part of the state, would provide raw material for some 800,000 tons of wood pulp. On a statewide basis it could be converted into about 140 million gallons annually of industrial alcohol now needed in the national defense program.

This doesn't mean that wood waste hasn't been utilized. Actually, manufacturing plants in the Pacific Northwest are already using some 500 million board feet of salvaged material. However, in the past, much of the unsued wood could not be handled because it would not pay its way to suitable markets. With the continuing development of new uses and favorable markets for wood products and with improved methods of logging small timber, utilization of left over wood is becoming increasingly attractive to the pulp and paper, as well as other industries.

The report gotten out by the Institute reveals by colored maps and graphs the facts and figures showing amounts, locations and accessibility of unused wood supplies in the state. Such a study should go a long ways in broadening the scope of wood utilization and in assisting the establishment of new industries.

ASTEN

dryer felts



FEWER CHANGES

The unique construction and long life of ASTEN Dryer Felts are your assurance of fewer changes in machine clothing, less down-time, and sustained production. That's why, among papermakers everywhere, ASTENS are known for

Economy in the long run

ASTEN-HILL MFG. CO.
PHILADELPHIA, PENNA.

ASTEN-HILL, LTD.
VALLEYFIELD, QUEBEC

Proposed price roll-back viewed with concern

P. I. atmosphere filled with questions: . . . If effected would price roll-back curtail paper production? . . . Will some mills find it necessary to cut production because of pulp shortage? . . . What is the prospect for settlement between labor representatives and wage stabilization boards?

▶▶▶ EFFORTS TO BREAK the stalemate in the wage-price-industrial mobilization situation have been handicapped by the very definite easing of the crisis in international affairs. With the fears of a possible extension of the war in Korea to other parts of the globe somewhat lessened, public pressure to crystallize the mobilization picture has abated, thereby making the task of the Washington officials increasingly difficult.

Of chief interest to the paper industry, however, is the drafting of a regulation which would result in a roll-back of prices on many grades. Pressure against such a regulation is building up rapidly from all groups of industry, but some regulation may be issued in the very near future.

The proposed order was discussed by Price Stabilizer DiSalle with some thirty industrialists, including two from the paper industry, who believe that the order would result in a curtailment of paper production.

According to press releases, the proposed regulation will attempt to effect a roll-back of prices where justified, with relief in hardship cases, but a restoration in broad terms of a normal cost-price relationship. The second quarter of 1950 would be used as a base period, and a new ceiling would be established based on prices then in effect, adding increases in material costs to January 31 and wage increases to March 15. This ceiling, however, can not be more than 5 per cent above the present price ceiling, or 10 per cent more than the base period price.

Inasmuch as the second quarter of 1950 was a low price period, and there have been heavy increases in material costs since January 31, particularly in raw materials, the result would be a roll-back in prices of many grades of paper.

Meanwhile, vigorous efforts are under way to insure the continuance of operations through the application of maintenance and repair regulations which would enable the paper mills to secure materials needed to keep the machines in uninterrupted operation.

Set-aside percentage on some grades of paper increased by NPA

The National Production Authority has increased the percentages of various grades of paper which industry must reserve for Government requirements. Also, the order, issued March 21 (effective immediately), allows printing firms with Government contracts to draw on these reserves for their requirements of paper. Reserve percentages were changed as follows: Crepe wadding for packing, increased from 10 to 25 per cent; special industrial paper upped from 5 to a new reserve of 15 per cent; book and fine papers upped from 10 to 15 per cent. On the other hand the reserve percentage was reduced for printing converting papers from a former 10 per cent to 5 per cent and the same reduction was applied to machine coated papers. In all cases the reserve requirements were changed to accord with the demonstrated need as shown by orders placed for Government agencies in recent months.

Pulp supply affected by price regulation

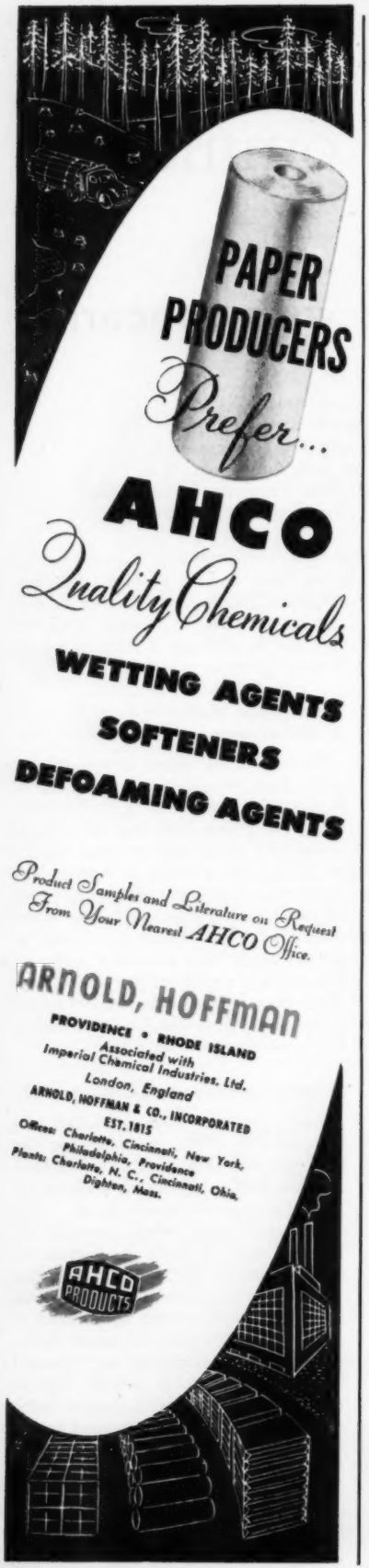
The import situation is also a troublesome problem; especially in the paper field, where there is so much foreign pulp required. At a conference with Price Stabilization officials, an Import Industry Advisory Committee said that the present ceiling regulation limiting prices to the highest level reached between December 19, 1950, and January 25, 1951, is not sufficiently broad. In pulp the over-all price situation is such that there is danger of diversion of European shipments to other markets. Some mills in the fine paper field are already being forced to curtail operations because of lack of pulp. In general the importers said that the general price freeze had so "stymied" their business that imports had fallen off drastically in the last two months. This was not true in the case of dutiable papers through January, however.

Wastepaper market in need of stabilization

Production of paper continues generally high, though not up to the record figures of a few weeks ago. The mills still have heavy back-logs of unfilled orders. An effort will be made shortly to stabilize the wastepaper market. The present proposal is to roll back the prices of the higher grades, while the lower grades will be allowed to remain at present levels. The argument against a low ceiling is that it might cause a black market and reduced collections of wastepaper while a reasonably high ceiling would encourage collections.

Wages—salaries—mobilization

The problem of wage and salary stabilization is still a headache for the mobilization authorities. No terms have been reached by which the walk-out of the labor representatives on the wage stabilization board would be adjusted. Industry representatives are opposed to a settlement on the terms of the labor union representatives who have been charged with demanding such authority as would enable them to secure deferments for their members in a general troop mobilization. A definite step to force the issue has been Economic Stabilizer Johnson's refusal to approve an 11c hourly increase for meat workers. Industry representatives complain that while such men as Wilcox and Johnson have patriotically given up all their normal business affiliations to accept far lower remuneration at Government standards,



the union representatives have insisted that they be allowed to retain their official connections with the labor movement.

House orders another newsprint inquiry

Another newsprint investigation has been ordered by the House of Representatives which instructed the Interstate Commerce Committee to inquire into rising newsprint prices which one Congressman called a gouge on American publishers. Differing from earlier investigations, however, this inquiry will be limited to the United States, and will not include Canada. The domestic newspaper publishers have asked the United States Government to give Canadian paper manufacturers priority assistance in securing steel, sulphur and other necessities to enable them to continue adequate output.

Freight rate increase . . . Reciprocal trade

The Interstate Commerce Commission has authorized an emergency increase in freight rates amounting to 4 per cent in the region north of the Ohio and east of the Mississippi, and 2 per cent elsewhere. The railroads had asked a blanket 6 per cent increase.

The Finance Committee of the United States Senate has devoted nearly a month to hearing testimony on the extension of the Reciprocal Trade Agreement Act, an extension which was opposed by the paper industry unless the revised law gives better protection against undue foreign competition. These extensive hearings indicate that the Senate may not be in a mood to extend the law unchanged, as requested by the Administration. The fact that the State Department has agreed to accept some portions of the revised measure indicates a fear by the Administration that the program may be entirely scrapped.

OPS Appointments . . . Forest Products Division

The following appointments to the Forest Products Division have been announced by the Office of Price Stabilization:

Director—John D. Mylrea

Acting Asst. Director—Walter J. Damtoft

Acting Chief, Lumber and Wood—Norman O. Cruver

Acting Chief, Paper and Paperboard —Rufus I. Worrell

Things to come from NPA and OPS

Among new controls (unofficial as yet) that may be issued by the NPA are that sulphur, sulphuric acid, napthenic acid and benzene are to be put under allocation control. This will come in the form of an amendment to M-45. (Read item in Industry News)

A controlled materials plan will go into effect on July 1, and will replace the priority system of DO ratings.

A proposed regulation just made public by the OPS would take all manufacturers out from the General Ceiling Price Regulation. This proposed order would require manufacturers in all industries to make new calculations to determine their ceiling prices. If put into effect as published, this regulation will become effective on April 23.

GOP balks at keeping Reciprocal Trade "as is"

A revolt of Administration opponents, both Republican and Democratic, against Administration programs was exemplified when the House of Representatives by overwhelming majorities turned thumbs down on the Government demand for a continuance "as is" of the Reciprocal Trade Agreement program.

Financial

Securities markets have eased off with the brightening of the international situations, some pessimism being shown by an increasing short interest in the market. Investors, however, do not seem alarmed, for the sag in prices was accompanied by a drying up of the volume of transactions.

American Writing Paper Co.—Net income for 1950 was $550,378 as compared to a loss of $130,152 in 1949.

Celotex Corp.—Net income for the fiscal year ended Jan. 31 was $930,503 as compared with $250,689 for the preceding fiscal year.

Certain-teed Products—Net income in 1950 was $6,380,009 as compared with $4,648,808 in 1949.

Container Corp.—Net income for 1950 was $1,542,821 as compared with $12,726 in 1949.

Crown Zellerbach Corp.—Net income for three months ended Jan. 31 was $17,700,922 as compared with $13,924,396 in 1949.

Dixie Cup Corp.—Net income in 1950 was $2,917,554 as compared with $1,953,-443 in 1949.

Eastern Corp.—Net income for 1950 was $1,542,821, as compared with $12,726 in 1949.

Great Northern Paper Co.—Net income in 1950 was $4,319,961 as compared with $4,856,631 in 1949.

Hollingsworth & Whitney—Net income in 1950 was $2,025,976 as compared with $1,301,758 in 1949.

National Container Corp.—Net income for 1950 was $6,658,496 as compared with $2,578,621 in 1949.

Puget Sound Pulp & Timber Co.—Net income in 1950 was $3,601,799 as compared with $1,126,497 in 1949.

Robert Gair Co.—Net income in 1950 was $4,319,961 as compared with $4,684,-808 in 1949.

Scott Paper Co.—Net income in 1950 was $7,195,171 as compared with $5,626,603 in 1949.

Southland Paper Mills—Net income for

1950 was $3,452,682 as compared with $3,572,841 in 1949.

Soundview Pulp Co.—Net income for two months ended Feb. 28 was $845,498 as compared with $741,482 for the comparable period in 1950.

St. Croix Paper Co.—Net income for 1951 was $1,131,880 as compared with $1,115,186 in 1949.

Union Bag & Paper Corp.—Net income (preliminary) for 1950 was $10,897,604 as compared with $7,486,639 in 1949.

United Board & Carton Co.—Net income for nine months ended Feb. 3 was $560,840 as against $42,509 for the comparable period a year previous.

West Virginia Pulp & Paper Co.—Net income for three months ended Jan. 31 was $2,678,000 as against $1,963,000 for the same period a year ago.

Paper Mill Corporate Changes

Brown Paper Mills Co., Inc.—The Prudential Insurance Co. has purchased $10,000,000 in 3½ per cent notes maturing in 1966 and 1974.

Kimberly-Clark Corp.—A distribution of 200,000 additional shares of common stock has been authorized to partly finance the $19,000,000 expansion of its cellulose wadding subsidiary, an expansion to increase its production about 34 per cent. The price quoted by the banking syndicate handling the issue is $45 per share.

Rhinelander Paper Co.—An underwriting group has offered 150,000 shares of Rhinelander common stock at 29½, to complete a $3,000,000 improvement program, to retire $2,150,000 in long term indebtedness and to increase working funds.

New York Stock Exchange—Stocks

	Closing Prices	
	March 20, 1951	Feb. 20, 1951
A.P.W. Products	*7⅛-8	*7¼-7⅝
Celotex	17⅝	17⅝
Same Preferred	*17-17¼	16⅝
Certain-teed Products	17⅛	16⅝
Champion P.&F. Co.	50	56¼
Same Preferred	101½	*107-108
Chesapeake Corp.	*33-34⅛	33⅝
Continental Diamond	13⅞	15⅝
Container Corp.	36	39¼
Same Preferred	*104-104½	*103½-105
Crown Zellerbach	50	52⅝
Same Preferred	*102-102⅝	105
Dixie Vortex	54	53
Same "A"	55	53½
Eastern Corp.	20½	20⅞
Robert Gair	12⅛	12⅜
Same Preferred	19¾	*19⅜-19⅞
Gaylord Container	26	25⅝
International Paper	50⅞	52⅝
Same Preferred	*106½-108	107⅝
Kimberly-Clark	44⅞	45⅞
McAndrews & Forbes	39½	40
Marathon	44⅜	43
Masonite	33½	31
Mead Corp.	25½	26⅝
Same Preferred	100	96
Same 2nd Preferred	*61-64	65-67
National Container	12⅝	12⅝
Rayonier, Inc.	48	50⅛
Same Preferred	*35⅜-36⅜	37⅛
Scott Paper	44½	45½
Same $3.40 Preferred	*97-99	*100¼-102
Same $4.00 Preferred	*103½-106	*107-107½
St. Regis	12⅝	13
Same Preferred	*92⅝-92½	95⅝
Sutherland Paper	*45⅛-45⅞	48
Same Preferred	*113-117	120
Union Bag & Paper Co.	40⅜	42⅞
United Board & Carton	*18⅜-19	19¼
United Wall Paper	3⅝	4
Same Preferred	*26-27	*26½-27
U.S. Gypsum	117½	116½
Same Preferred	*180¼-184	*182-185
West Va. P&P Co.	*76¼-77¼	82½
Same Preferred	110	110¼

New York Stock Exchange—Bonds

	Closing Prices	
	March 20, 1951	Feb. 20, 1951
A.P.W. Products 3%	96¼	96
Celotex 3¼%	102¼	102
Champion P&F Co. 3%	102	102
Mead Corp. 3%	107	107½

New York Curb Exchange—Stocks

Am. Writing	.....	8½
Great Northern	48½	48
Hammermill	.....	31½

*Closing Bid and Asked Prices

How a manufacturer cut costs tremendously with Goulds stainless steel pumps . . .

When handling corrosive liquids, pumps alone can be an important item in your processing budget. One alert plant engineer in the southwest cut his pump costs to about an eighth of what they had been.

The pumps he had been using for an especially erosive crystaline slurry cost $3250. When they wore out he replaced them with Goulds Stainless Steel Centrifugals for only $826. But this tremendous saving in initial cost was only half the pay-off. The Goulds pumps have already been in service *twice as long* as the ones they replaced . . . and they're still going strong.

The advanced design and simple construction of Goulds pumps make these savings possible. Bearings are prelubricated and fully protected. Stuffing boxes are under suction pressure to prevent leakage and assure long packing life. Parts are interchangeable. The impeller clearance can be adjusted for wear. Available in 9 sizes with capacities to 750 G.P.M. Send us the coupon today for full details.

Goulds PUMPS INC. Seneca Falls New York

GOULDS PUMPS, INC.
Dept. PI, Seneca Falls, N. Y.
Send Bulletin 725.3 on Goulds Stainless Steel Centrifugal Pumps.
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Company_____
Address_____
City_____ Zone____ State____

ALEXANDER CALDER
President of
Union Bag & Paper Corp.

THE SAVANNAH PLANT handled over 60,000 cars of inbound and outbound freight in 1950. This freight movement was 36 per cent of the inbound car loadings in the greater Savannah area. This air view of the plant was taken during the first week in March

Union Bag announces expansion for Savannah plant

Sixth paper machine to be added . . . also equipment to make semichemical pulp through use of gumwoods

▶▶▶ A MAJOR EXPANSION program for the Savannah (Ga.) plant of Union Bag & Paper Corp. has been announced by Alexander Calder, company president. The cost of this program was not revealed, but it will include the addition of a new paper machine and the installation of equipment for the manufacture of semichemical pulp through the use of gumwoods.

The addition of the semichemical pulping process to the Savannah plant's already highly integrated manufacturing and converting operation, and the installation of the sixth paper machine will increase the plant's daily production of kraft paper and kraft paperboard by approximately 400 tons and will add substantially to the number of employees on the Savannah payroll.

The semichemical pulp, Mr. Calder pointed out, will be used in manufacturing the paperboard which is used as the corrugated, or fluted, board that goes into the manufacture of corrugated shipping containers. It is proposed to convert the semichemical pulp into paperboard on the plant's No. 2 paper machine which is now producing both kraft paper and kraft liner board. The new sixth machine will be used for the manufacture of kraft paper.

Work on the several projects in the broad expansion program, Mr. Calder stated, will get under way immediately, and is expected to be completed during the first half of 1953. Morton C. Tuttle Company, of Boston, which has completed several expansion projects at the Savannah plant, will be general contractor, and the engineering is being done by the plant's construction engineering department with Robert T. Inman, chief engineer, in charge.

It was pointed out that the construction of the semichemical pulping process plant and the installation of the new paper machine would employ approximately 600 construction workers.

The new paper machine, which will be installed in the paper machine room adjacent to the No. 5 paper machine, will be especially constructed to Union Bag's specifications and will produce a sheet of kraft paper nearly 20 feet wide.

Mr. Calder stated that the company was desirous of completing the expansion projects in a minimum of time in order that the additional tonnage of paper and paperboard would be available in the national preparedness program.

The manufacture of semichemical pulp in the Savannah plant with gum or hardwoods as the basic raw material will afford Union Bag an opportunity of making another contribution to the economy of the state. Forest landowners will not only be afforded a new and steady market for their gumwood but the cause of forestry will be advanced by the removal of hardwoods which are retarding the growth of pine trees on many forest tracts, and by affording owners of timberland acreage a better balance of timberland growth and more efficient timberland management.

Calder reviews progress at Savannah

In announcing the expansion program, Mr. Calder took occasion to review the history of the Savannah plant. He stated that when Union Bag came to Savannah the city officials and the members of the Industrial Committee of Savannah were assured that additional manufacturing facilities of the company would be integrated with the local operation. "We have done this," he added, "and I personally feel that the installation of the

semichemical plant and the sixth paper machine will mark the beginning of another era of greater plant development and broader usage of our industrial know-how."

"The growth of the Savannah plant," Mr. Calder said, "has been rather phenomenal, and in looking back to 1936 when our first machine was started it is with some degree of satisfaction that we ponder the great forward strides we have made. Less than 15 years ago we employed only 600 people at a total annual wage of approximately $1,000,000, and today we have more than 5,000 persons on our payroll at Savannah who this year will receive wages and salaries in excess of $15,000,000. In addition to the employees in the plant, the wood consumption of the Savannah mill requires the full time of 4,000 persons employed in the woods by dealers from whom we purchase wood."

"In appraising the contributions made by our Savannah plant to the economy of this region, it is significant to note that products of the plant are sold in each of the 48 states and in more than 20 foreign countries. This broad market provides for a maximum of local employment, and gives us every reasonable assurance of a steady operation inasmuch as we would not be affected too greatly by adverse business conditions in any one or several community outlets."

"The plant generates enough electrical energy to service a city as large as Savannah, and last year its freight bill amounted to more than $10,000,000. More than 60,000 cars of inbound and outbound freight were handled during 1950. This freight movement represented 36 per cent of the inbound car loadings and 22 per cent of the outbound car loadings in the greater Savannah area."

The plant is now spending approximately $12,000,000 a year for pulpwood, most of which comes from Georgia. This annual wood bill, Mr. Calder said, will be substantially increased on completion of the installation of the semichemical plant and the new paper machine.

"Since the beginning of the Savannah plant," Mr. Calder explained, "Union Bag has been vitally concerned with and actively engaged in forest conservation and reforestation. We have been ever mindful of the fact that the wise use of our forest resources is essential to sustain prosperity and the general welfare. Our woodlands division, which is in charge of wood procurement and forest management, practices selective cutting on the company lands and recommends this good forestry practice to timber tract owners from whom we purchase pulpwood. It has been gratifying to us to note that proper thinning, or selective cutting of trees, is rapidly becoming the rule rather than the exception."

"In contributing to the over-all forestry program in Georgia, the company promotes a sustained 'fire prevention' program and each year as a part of its over-all conservation program distributes free of charge from two to three million pine seedlings to private landowners through county, state and federal conservation agencies. Mechanical tree planters are made available to recipients of the seedlings without cost as are professional services."

"About three years ago we inaugurated in our woodlands division what is known as a conservation department. This department is staffed by six graduate foresters and their services are offered without charge to any landowners interested in properly thinning his standing timber for pulpwood or who might desire professional advice on a forest problem. We emphasize the fact that the principal duties of the conservation foresters are to work with private landowners to the end that their forest lands will produce a maximum of revenue over an extended period of time."

Mr. Calder pointed out that other phases of the company's state-wide forestry program includes the sponsorship of forestry camps for Georgia youths and the awarding annually of two forestry scholarships to the University of Georgia and two forestry fellowships to the Graduate School of Forestry at Duke University; placing of advertisements in all Georgia newspapers, and the distribution of booklets which point out the value of intelligent forest management and the importance of keeping fire out of the woods. Several booklets—a Georgia forest map—sound slide films, and other materials of an educational nature prepared especially for use by youthful Georgians are made available to school teachers and students by the plant's public relations department.

Sorg Pulp Co., Ltd., Acquired by Can. Forest Prods. Ltd.

Formal agreements have now been concluded for the acquisition of a majority interest of Sorg Pulp Co. Ltd., Port Mellon, B.C., by Canadian Forest Products Ltd., Vancouver, B.C. The Sorg Paper Co., Middletown, Ohio, previous owner of Sorg Pulp Co. Ltd., is retaining a minority interest in the new company, which is to be known as Howe Sound Pulp Co. Ltd. A small interest was purchased by Perkins-Goodwin Co. of New York City, who will act as the exclusive sales agent for Howe Sound Pulp Co. Ltd. Jay Corporation of New York City served as broker in the transaction.

A very extensive program of rehabilitation and modernization of the mill is in progress at Port Mellon. Operation of the mill is expected to begin on May 1, 1951, with production at the rate of approximately 120 tons per day of unbleached kraft pulp, gradually increasing to 175 tons daily. Approximately $4,000,000 will be spent for improvements over the next twelve months. P. R. Sandwell of Vancouver is in charge of the engineering and B. C. Bridge and Dredge Co. Ltd. of Vancouver is the contractor.

The location of Port Mellon, only 25 miles from Vancouver, lends itself to proper utilization of sawmill waste from the Vancouver area and it is intended to use mainly chips produced from such waste for raw material. Eburne Saw Mills Division of Canadian Forest Products Ltd. will produce the bulk of the necessary chips and supplement any shortage by buying sawmill waste material from other mills in the Vancouver area. This source, coupled with the timber resources of Canadian Forst Products Ltd., should guarantee an unlimited life for Howe Sound Pulp Co. Ltd.

The mill will give permanent employ-

A NEW LOCATION!

After April 16, our address will be—

431 South Dearborn Street, Chicago 5, Illinois

Suite No. 1220 • *Phone number unchanged: Wabash 2-3543*

Fritz Publications, Inc.

The Paper Industry

Paper and Pulp Mill Catalogue

ment to approximately 200 people immediately. The present townsite is also undergoing a complete rehabilitation program to provide the best housing facilities.

The Provincial Government, recognizing the importance of this project to closer forest utilization and to the whole economy of the Province and the Sechelt Peninsula in particular, is completing the road from Gibson to Port Mellon this year. This, together with the new car ferry service starting this spring from Horseshoe Bay to Gibson, will practically bring Port Mellon into the Greater Vancouver area.

Building and Stock of Straubel Paper Co. Damaged by Fire

The main converting room of Straubel Paper Co., Green Bay, Wis., was destroyed by a fire which broke out from an unknown cause on the morning of March 16.

The approximate $100,000 loss was covered by insurance, according to James Straubel, vice president of the firm. Company officials commented, however, that it will be some time before an accurate estimate can be made concerning the damage. It is doubted that the converting machine can be repaired.

The fire was confined principally to a section of the plant where most of the company's converting is done; more than 300 rolls of paper in the area were damaged by either fire or water. No firemen were injured in combating the blaze, although burning paraffin and oils used to treat the paper made control of the fire difficult.

The warehouse section which is used to store finished products was damaged by smoke, as were the office sections. Limited production may be continued in a section, shut off by fireproof walls, which contained toilet tissue and towel converting machinery.

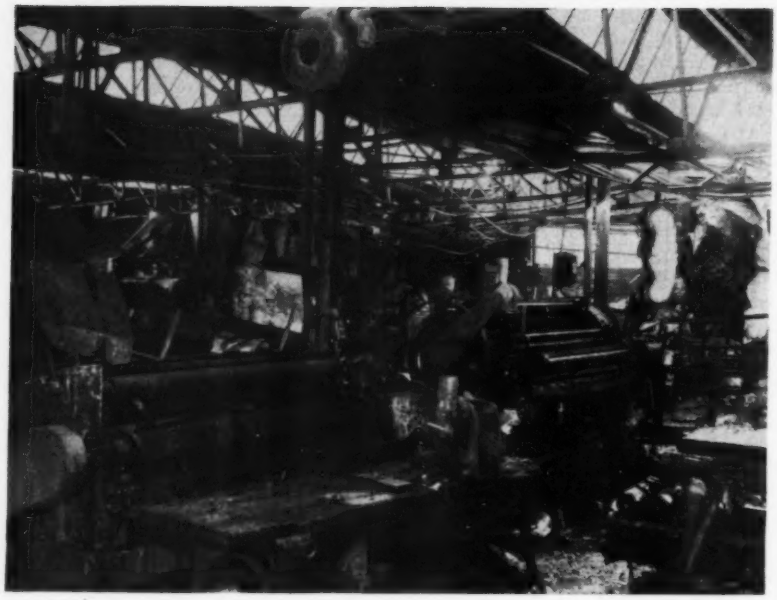
Before plans were disrupted by the fire, Straubel Paper was in the process of moving some of its operations to a new plant at Nichols, Wis. Machinery damaged in the fire had been awaiting removal to the Nichols plant, where construction is completed.

Lowell Summer Course Announced by Boston Paper Trade Ass'n

Applications for the two-week summer course in "Paper—Its Properties and Uses," given at Lowell Textile Institute, Lowell, Mass., by the Boston Trade Association from June 11 to 22, 1951, are now being accepted.

Last year 19 men engaged in paper, paperboard and allied industries attended the course. Again this year, Dr. G. Broughton, head of the Department of Paper Engineering, and William B. Wheelwright, will be course instructors. The syllabus will be unchanged except for the addition of some laboratory work given under the direction of A. K. Hobbs; emphasis is on informal discussion with industry experts on such subjects as paper production, coloring, requirements for various end-uses, etc.

Students are required to reside in a Lowell dormitory during the two week term. Tuition, including books, meals and dormitory accommodations, is $150. Applications should be made to Professor G. Broughton, Lowell Textile Institute, Lowell, Mass., and should include a prepayment of a $10 registration fee.



DEVASTATED . . . View of one part of Straubel Paper Co. after fire

Bird Old-Timers Meet for Annual Banquet— 7 Total 464 Years

More than 400 members of the Bird & Son Quarter Century Club and their guests gathered in the ballroom of the Copley Plaza Hotel, Boston, on February 28 for their annual banquet. Guests from the firm's East Walpole and Norwood, Mass., and Phillipsdale, R.I., plants included 25 members who retired from company service last year.

Honored at the head table were seven men and one woman whose years of association with Bird & Son total 464 years; among these was Elmer H. Bartlett, who at the age of 84 is still an active member of the board of directors. Mr. Bartlett's service to the firm has been continuous since 1885. The firm itself was established in 1795; the Quarter Century Club was originated a year ago.

President A. H. Anderson, a Quarter Century Club member himself, addressed the gathering, congratulating his fellow workers on their years of loyal service to the company.

Gardner Board and Carton Co. Offers Prizes for New Emblem

Three design contests with cash awards totalling $750 will be conducted by The Gardner Board and Carton Co., Middletown, Ohio, so that a new emblem may be found for the firm's products. The firm is searching for a new emblem which will be attractive and will identify Gardner to the general public. The firm feels that the present Gardner emblem is unsatisfactory from the point of view of eye-appeal, and does not particularly identify itself with the company or its products.

Regularly enrolled students at the School of Dayton Art Institute and the Art Academy of Cincinnati are eligible for two of the three contests. First prizes of $200 and second prizes of $50 will be awarded to the best student contribution at both institutions.

The third contest, which offers the same $200 and $50 prizes, is open to the general public, including Gardner employees and their families with the exception of board members, management, art department employees and those employed by the firm's advertising agency.

The contest opened March 5, and will close May 30. Entries should be mailed to The Gardner Board and Carton Co.,

At left, Steam Joint constructed for use with adjustable single Drop Type Siphon.

Below, Dual Revolving Type Siphon Arrangement.

Cuts Power Costs

It takes extra power to keep Dryers rotating at high peripheral speeds when condensate drainage is slow and inadequate. Power losses may range as high as 50%. Operating speeds and drying rate are reduced.

With Puseyjones Improved Steam Joints and Revolving Dual Siphons, condensate drainage is continuous and automatic. Dryer Cylinders are completely filled with steam. Power is saved. Drying rate is increased and higher operating speeds are realized. The unique Steam Joint design assures minimum frictional resistance between revolving and stationary parts.

Many mills have included Puseyjones Steam Joints and Siphons in Machine modernization programs with outstanding production results. If your power costs are high and your present machines are not operating at their full potential, investigate the advantages of the Puseyjones Steam Joint and Siphon. For complete information, write today for your copy of the "Steam Joint Bulletin."

THE PUSEY AND JONES CORPORATION

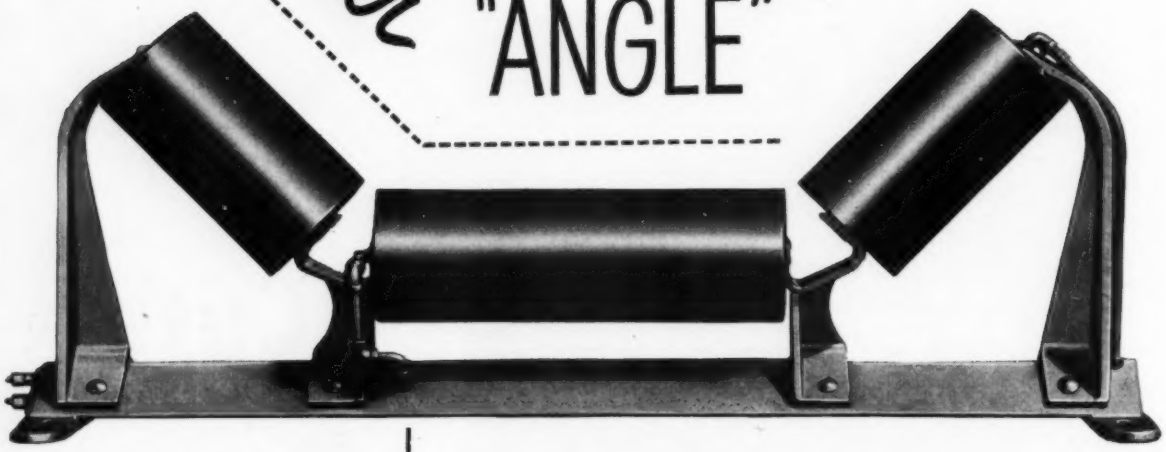
Established 1848. Builders of Paper-Making Machinery

Fabricators and Welders of All Classes of Steel and Alloy Products

Wilmington 99, Delaware, U.S.A.

THE SIGN OF TRADE MARK SUPERIOR QUALITY

here's a better "ANGLE"



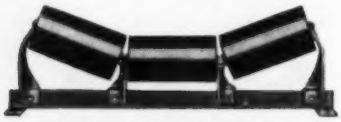
for handling your wood chips!

Here's an idler that's "custom-made" for handling wood chips. It's the Rex Style No. 46 Troughed Belt Wood Chip Idler. The end rolls are sloped at a 45° angle instead of the 20° angle of conventional idlers. To receive full advantage of this idler construction and longer belt life a very flexible type of belt must be used. Loading much closer to the belt edge results in increased capacity without increasing the chance of spillage.

No. 46 Troughed Belt Wood Chip Idlers contain all the outstanding Rex advantages that mean minimum service cost . . . maximum service life. Triple labyrinth grease seal, tapered roller bearings, interchangeable rolls, large grease reservoir and unrestricted passage to both bearings . . . these are a few of many Rex features that mean lower maintenance cost and important savings to you in longer Belt Idler life.

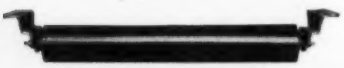
For all the facts, call your nearest Chain Belt Field Sales Engineering Office or write to Chain Belt Company, 1714 W. Bruce Street, Milwaukee 4, Wis.

Other Rex Belt Conveyor Idlers



Rex Standard Troughing Idlers

Rex Flat Belt Idlers



Rex Return Idlers

Many other types of Rex Idlers are also available as well as a complete line of pulp and paper mill chains, wood and refuse conveyors, white water recovery equipment and process and waste screening equipment.

CHAIN BELT REX COMPANY ®

BELT CONVEYOR IDLERS

General Offices, 407 Charles St., Middletown, Ohio. Each entrant may submit as many entries as desired, but each individual entry must be accompanied by a completed entry blank obtained from the firm's Public Relations offices at the Charles St. address. No entries will be returned, and judges' decisions (based on originality, uniqueness, eye-appeal and adaptability to Gardner business) will be final. Duplicate prizes will be awarded in case of ties; all entries shall become the property of the company.

SALE OF Ryegate Paper Co., of East Ryegate, Vt., has been announced as acquired by interests connected with White Mountain Paper Co., Inc., and Green Mountain Paper Co., Inc., of Bellows Falls, Vt. Max D. Bliss, president of Ryegate, has been elected president by the new owners. Other officers named are: Pearl B. Bliss, vice president, and Frederick W. Vogel, treasurer. Ryegate's general manager, Thomas B. Farwell, will continue in the same office with the new operators.

Comparative Figures on Dutiable Paper and Board Issued by Import Comm.

Although annual totals of paper and paperboard imports have not been published officially, the Import Committee of the American Paper Industry has compiled figures from its month reports.

The Committee's tabulation of imports of dutiable papers and board for 1950 as compared with 1949. It will be noted that the dollar value in 1950 was 25 per cent higher than in 1949. It is pointed out by Warren B. Bullock, Manager of the Import Committee, that this trend is continuing in 1951 with preliminary figures for January showing nearly double the dollar value of the same month of 1950. It is also pointed out that the increase in imports of paperboards, due to the reduction of duty rates through the Reciprocal Trade Agreement negotiated at Annecy a year ago is startling.

Imports of dutiable papers and paperboard (calendar year)

GRADE	1949 POUNDS	1949 VALUE	1950 POUNDS	1950 VALUE
Printing Papers	56,513,472	$ 3,312,472	70,482,369	$ 4,163,367
Wrapping Kraft, M.G.	1,759,236	113,921	6,416,232	411,210
" " M.F.	5,937,463	388,792	8,354,574	524,873
" Sulphite, M.G.	3,495,415	184,328	1,978,951	118,998
" M.F.	191,483	13,405	464,691	28,053
" Other	59,122	4,262	2,282,475	195,381
Glassine	1,425	1,615	1,007,065	120,632
Vegetable Parchment	14,296	11,030	36,685	15,664
Greaseproof n.s.p.f.	26,061	11,192	1,314,127	145,316
Writing	74,038	23,318	217,828	51,948
Drawing	37,177	18,714	62,682	27,530
Hand Made	150,872	93,710	208,878	106,852
Photo Basic	698,477	324,389	1,232,515	506,192
Bristol	113,735	30,095	462,832	78,595
Fancy Papers	74,575	67,454	626,812	280,827
Tissue not over 6 lb.	377,505	287,366	521,217	321,771
Tissue - Other	390,331	280,175	589,402	348,629
Bible - 6-10 lb.	11,802	9,399	4,803	5,868
" -10-20½ lb.	39,950	48,603	132,089	84,866
Pulpboard Rolls for Wallboard	44,750,642	1,656,597	50,622,993	1,883,877
Paperboards and Pulpboards	96,061,335	5,074,790	118,682,578	5,269,035
Hanging Raw Stock	28,254	2,664	135,600	9,905
Cigarette Paper	4,991	4,488	248,486	77,949
Decalcomania Paper	1,176,183	375,035	2,219,694	544,031
Crepe Paper	2,694,747	239,858	905,344	84,605
Other Papers	-	226,318	-	463,441
TOTAL VALUE		$12,793,170		$15,869,467

(Compiled by the Import Committee of the American Paper Industry)

Olin's new cellophane plant

In the center foreground of this artist's sketch is shown the new cellophane plant being built for Olin Industries, Inc., at Pisgah Forest, N. C. This eight-machine plant (scheduled to be in production in September) will have an annual capacity of 33 million pounds of cellophane, and is being constructed on the site of the Ecusta Paper Corp. The Ecusta plant appears in the background

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Frontenac Mill Again Changes Hands—New Owners Have No Future Plans

Word has been received that the old Frontenac paper mill and hydroelectric development at Dexter, N.Y., which were purchased last fall by Abe Cooper Corp. from the Dexter Sulphite Pulp and Paper Co., (See P.I., September, 1950), has been acquired by the newly-organized Hounsfield-Brownville Land Corp., which will control them in the future.

Mr. Cooper has made no comment concerning the future of the old mill, destroyed by fire last June (See P. I., June, 1950), but it is known that the burned-out machinery is being removed from the mill; settlement of the present world disturbance will probably decide the future of the plant.

A PERMIT HAS BEEN ISSUED to Hammermill Paper Co., at Erie, Pa., for the erection of a new $166,000 building which will be part of the plant's wood digestion system.

ALL NECESSARY MATERIALS for a $400,000 building addition to the plant of Westminster Paper Co., Ltd., Toronto, have been purchased. Contractors are already at work on the addition, which is only part of a $2,000,000 expansion program being undertaken by the firm. A paper machine capable of producing 40 to 45 tons daily is also on order; the plant currently produces more than 20,000 tons of paper specialties a year. The new facilities should be in operation by the middle of 1952.

FIFTEEN NEW DRYERS have been installed on the No. 3 machine of Bathurst Power and Paper Co., Bathurst, N.B. The new equipment will give 150 pounds pressure psi, compared to the 40 pounds provided by the old dryers.

AN EXPANSION PROGRAM DESIGNED to double the capacity of its Fort Smith, Ark., plant and increase capacity of its main Easton, Pa., plant will be undertaken by Dixie Cup Co. at an estimated cost of $1,500,000.

New orders from NPA . . . priorities . . . set-aside amended . . . chemical allocation

▶▶▶ A new priorities number, known as DO-97, has been created by the National Production Authority to enable any business enterprise or other establishment to obtain limited quantities of maintenance repair and operating supplies (MRO).

This order (the NPA's Reg. 4) permits the use of the DO-97 on MRO orders up to a dollar amount that's equal to the dollar total of MRO items you had delivered during the calendar year 1950 —or during the fiscal year that ends nearest Dec. 31, 1950.

But, your MRO operation must be set up on a quarterly basis. Your quarterly dollar quota of DO-97s is either (1) one-fourth of your calendar 1950 consumption, or (2) your consumption in the corresponding quarter of your base period. Option 2 is designed to take care of companies with wide seasonal fluctuations.

If your MRO purchases do not exceed $1,000 a quarter, you do not need to figure a quota—you only use the DO-97. There are, however, special provisions for new business started during 1950. New companies may buy "the minimum amounts necessary for operation" up to $5,000 per quarter. If they will use more than this amount of MRO supplies, they must obtain an OK from NPA.

Following is a definition of MRO given by the NPA:

Maintenance Supplies—That which is necessary "to continue any plant, facility, or equipment in sound working conditions."

Repair—"the restoration of any plant, facility, or equipment to sound working condition when it has been rendered unsafe or unfit for service by wear and tear damage, failure of parts, and the like."

Operating Supplies—"Any materials which are normally carried as operating supplies . . . materials incorporated in a product ordinarily may not be treated by the producer as operating supplies," but may be considered as such under certain circumstances.

▶▶▶ The new Chemicals Allocation Order, released March 19 by the NPA, is a regulation providing the mechanism by which allocations of scarce chemicals will be made.

This order, designated as M-45, provides for three appendices, A, B, and C. No deliveries are authorized of materials listed in these three appendices except upon authorization of NPA to the supplier.

Three general systems of allocation are provided corresponding with the appendices A, B, and C.

No chemical is listed in any appendices in the original order, but it is expected that sulphur will be one of the first chemicals to be so listed.

▶▶▶ NPA has issued an amendment to order M-36 authorizing mills to establish set-aside percentages for Government orders (Cf. P.I. March, 1951).

As of March 21, these changes were made in reserve production percentages:

	Old M-36 (per cent)	M-36 as amended (per cent)
Printing and converting papers, paper-machine coated	10	5
Book & Fine Papers	10	15
Special Industrial Papers	5	15
Crepe Wadding for Packing	10	25

Marathon Corp. Purchases Oswego (N.Y.) Plant from St. Regis Paper Co.

Purchase of the Oswego, N.Y., plant of St. Regis Paper Co., by Marathon Corporation of New York, has been anounced by Wm. L. Keady, president and general manager of Marathon, and Roy L. Ferguson, president and board chairman of St. Regis.

The announcement states that the properties being acquired by Marathon consist of the kraft paper mill, the multiwall bag plant and the machine shop of the engineering and Machine Division of St. Regis. The sale does not include equipment in the bag plant and the machine shop.

Under the terms of the agreement, St. Regis will continue to get a major part of the output of the kraft paper mill over the next several months. St. Regis expects a start in production around the first of next year by the new kraft paper facilities which it has presently under construction in Florida. During the period St. Regis plans to remove its bag manufacturing operations from Oswego.

Delivery of the machine shop building to Marathon, according to the announcement, will not take place until July 1, 1953, and in the meantime St. Regis will continue its operations in that plant.

Don C. Rawson will be the manager of the Oswego plant when Marathon takes over its operation. Rawson has been manager of Marathon's plant at Menominee, Mich. for the past four and one-half years. Previous to that he served in several supervisory positions in manufacturing. He has been with Marathon since 1933.

The Oswego properties, the announcement points out, will provide Marathon with an eastern production unit. Marathon plans to convert the former St. Regis mill to the manufacture of materials for the protective packaging of foods. Plans for conversion of present equipment and the installation of additional converting equipment are under way, but because of current shortages of vital materials, no date has been announced for completion of the conversion program. When completed, the company expects to have about the same number of people as are currently employed at the Oswego plant.

An important and basic economic reason for the acquisition of these properties by Marathon, the statement adds, is the fact that this company's largest woodlands and wood operations are located in the province of Ontario, where its Canadian subsidiary has cutting rights on some 5,000 square miles of pulpwood forests. In Marathon, Ontario, the company's pulp mill converts this wood into high grade bleached sulphate wood pulp. This pulp can be economically shipped to Oswego, located on the shore of Lake Ontario.

St. Regis, the announcement states, has for several years been moving in the direction of expanding its integrated operations in the South to gain the substantial economic benefits made possible through utilization of the company's own wood for the manufacture of pulp in an integrated operation.

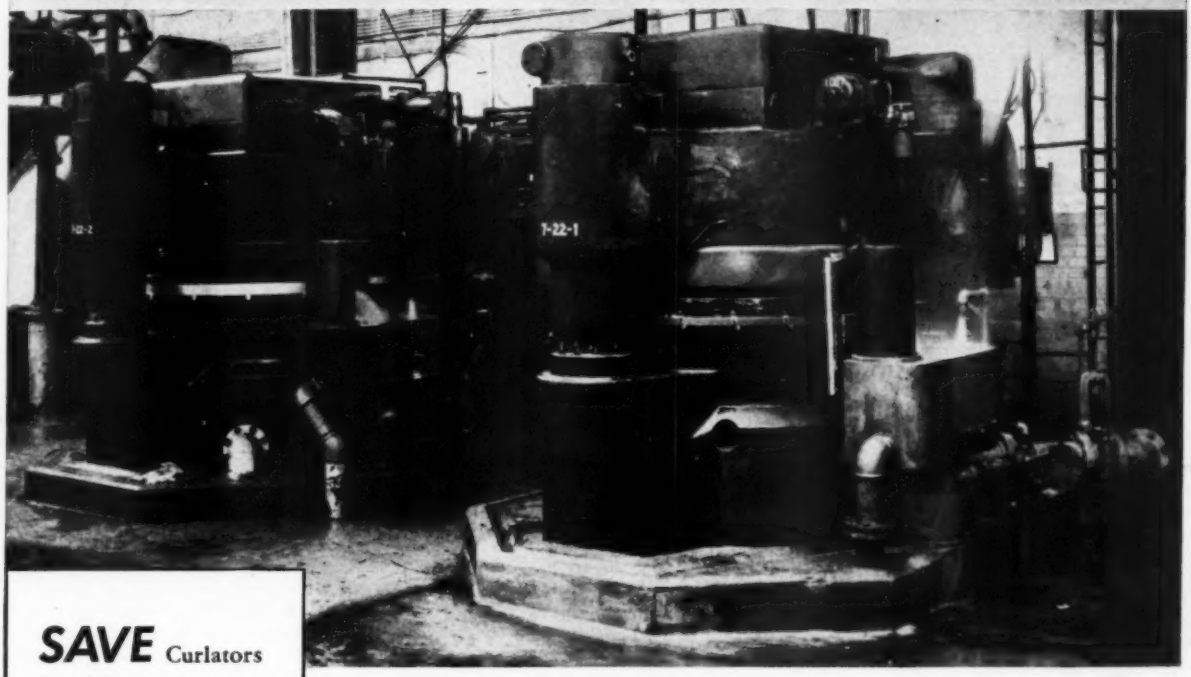
ALL OUTSTANDING STOCK of Falls Paper and Power Co., Oconto Falls, Wis., has been acquired by Scott Paper Co., Chester, Pa. Scott issued 30,000 of its common shares in exchange.

OPERATIONS HAVE BEGUN IN A NEW $1,000,000 plant of The Formica Co., Winton Place, Ohio, nearly completed at Evandale, Ohio. Finishing, inspection, packaging and shipping facilities of the firm have been relocated in the new plant which when completed will represent an investment of about $7,000,000.

SEVERAL MILWAUKEE FACTORIES of Milprint, Inc., will be consolidated in a new 280,000 sq. ft. plant being constructed in the same city. Occupation of the new site will not be completed until late this spring.

A COURSE OF TRAINING for all shift supervisors in the Paper Mill Division of Scott Paper Co., Chester, Pa., is to be inaugurated. Employees will be trained individually for four weeks in paper mill management and in other operating divisions of the plant. Planned to enable shift supervisors to assume more responsibility in the mill, the course also is intended to lighten the load of present division managers.

CURLATION CAN SOLVE THESE PROBLEMS!

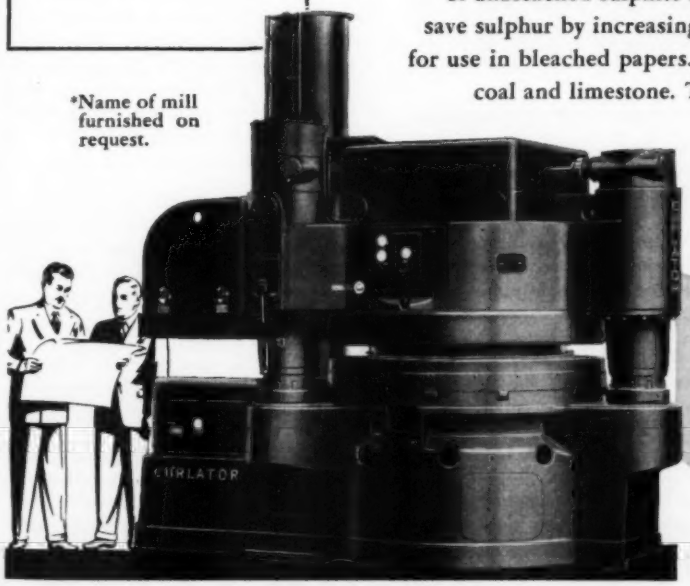


SAVE Curlators in mill operations are making substantial savings in sulphur, pulpwood, coal, and limestone.

These CURLATORS are saving this mill* more than 10% of sulphur, pulpwood, coal and limestone.

By *Curlation* you too may save 10% of your sulphur in the manufacture of unbleached sulphite for use in unbleached papers. You can also save sulphur by increasing the net yield, of unbleached sulphite pulp for use in bleached papers. In addition *Curlation* will save pulpwood, coal and limestone. These savings will not only lower costs but help conserve scarce materials.

*Name of mill furnished on request.



WRITE today and find out for yourself, without obligation, what a Curlator can do for you.

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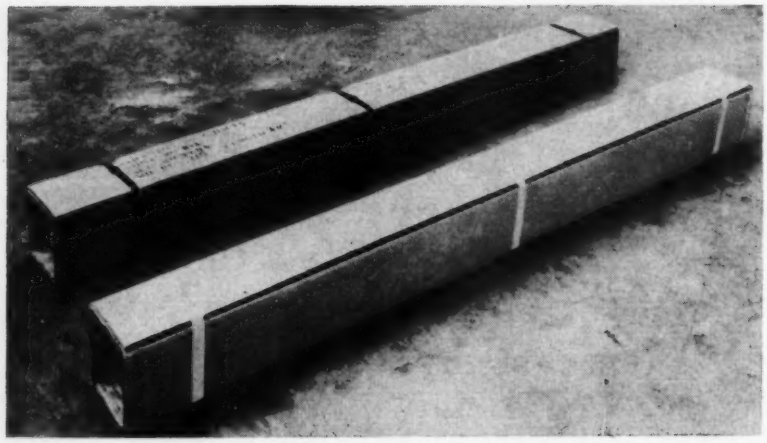
Corporation
565 BLOSSOM ROAD · ROCHESTER 10, NEW YORK

†T. M. Reg.—Curlator Corporation, Rochester, N. Y.



THIS SHIPMENT packed in a double wall, corrugated carton, secured with TAPE-STRAP, provided safer economical packaging

Unique New Method for Strengthening Packages

▶▶▶ A new concept of package strengthening, said to improve packaging methods, prevent pilferage, and strengthen a package by becoming part of it, has been marketed by Mid States Gummed Paper Co., Chicago.

Packaging and reinforcing material are integrated into a single working unit, called "TAPE-STRAP" by its manufacturers. Tensile strength of the new product—many tough shock-resisting fibers, lineally aligned, and laminated between two sheets of kraft paper, one of which is coated with a high strength animal glue—permits high tensile and tear strength, permanent adhesion to a variety of surfaces, flexibility, shock-resistance, and a proper balance between all glue properties.

Advantages of the use of "TAPE-STRAP" are said to include ease of application, since no special machinery or techniques are required; speed of application, since a strapping job is done with one operation; materials savings, since less "TAPE-STRAP" is reportedly required than is needed with other conventional reinforcing materials, and less costly cartons apparently can be used; labor saving, because only a minimum of non-fatiguing labor is needed to apply the tape; safety, because neither the packer nor the unpacker of a "TAPE-STRAP" reinforced package runs any chance of injury in his work; lack of damage to package contents or carrier; elimination of the disposal problem; and complete pilferage prevention, since "TAPE-STRAP" cannot be removed and replaced without detection.

Cartons containing up to 800 pounds of merchandise have been successfully reinforced with the new material; metal cables, wound on pulleys, have been held in place with "TAPE-STRAP" with labor savings of more than 90 per cent over previous methods.

A GRADUATE FELLOWSHIP of $2500 has been established at Case Institute of Technology by The Dow Chemical Co., Marquette, Mich., for the study of physical chemistry. The first graduate fellowship granted for this field by Dow, the Case grant honors Dr. William Reed Veazey, chairman of Dow's executive research committee and a member of its board of directors. The Veazey fellowship brings Dow's educational grants for this year to about $100,000.

A BRANCH FACTORY NEAR Mexico City, Mex., will be opened next summer by Sonoco Products Co., Hartsville, S.C. Sonoco has formed a new subsidiary, Sonoco de Mexico, S.A., to operate the plant—a $125,000 structure which will be equipped with $250,000 worth of paper converting machinery needing the services of about 50 persons—which was decided upon so that the firm may eliminate imports.

ACTIVITY SCOPE of R. S. Aries & Associates, New York, has been further expanded by the acquisition of the business of William Y. Agnew, New York consulting chemical engineer. Mr. Agnew, whose work has been in pigments, fertilizers and engineering design, was formerly employed by several companies which included National Lead, Dorr, and Imperial Chemical Industries. General engineering and drafting offices of the Agnew firm will remain at 500 Fifth Avenue, New York, although the executive offices will be transferred to the Aries offices at 400 Madison Avenue.

Stowe-Woodward Executives Subscribe to U. of Maine P & P Foundation

Five executives of Stowe-Woodward, Inc.., Newton Upper Falls, Mass., have "subscribed substantially as individual members" to the University of Maine Pulp and Paper Foundation, according to an announcement received from Philip S. Bolton, research director for Robert Gair Co., Uncasville, Conn., and chairman of individual memberships and curriculum committees for the Foundation.

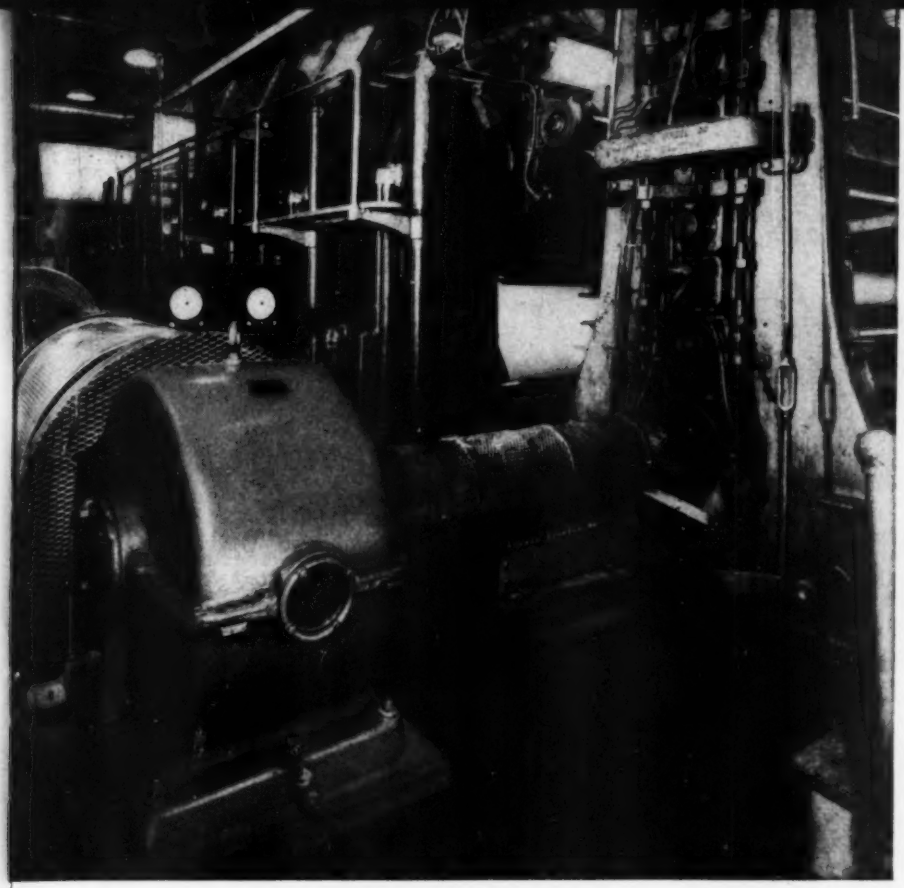
The purpose of the Foundation is to advance fundamental and applied research in pulp and paper technology at the university, as well as to increase teaching facilities in the field and to provide financial assistance for undergraduates. (Cf. P. I., March, 1951)

NEW YORK OFFICES of Arno W. Nickerson, maintained for the past several years at 441 Lexington Avenue, New York, were moved to 175 Maine St., White Plains, N.Y., where they will be operated under the name of Arno W. Nickerson, Inc. The Nickerson firm will continue the same services it has heretofore given; Clyde A. Benson, chief engineer, will continue in that capacity while serving as vice president of the new firm.

ACQUISITION OF The East Shore Machine Products Co. of Cleveland by The Lindsay Wire Weaving Co., also of Cleveland, has added 20,000 square feet of manufacturing space to Lindsay facilities. New looms and new wire cloth finishing equipment will be installed at the new site, and expansion will be conducted in the wire drawing, laboratory and engineering departments.

SAN FRANCISCO OFFICES of Hercules Powder Co., Wilmington, Dela., have been moved from 256 Montgomery St. to the Standard Oil Building, 225 Bush St., where the new telephone number is YUkon 6-2535.

FOR USE IN FABRICATION of plastics and light metals, Yoder Manufacturing Co., Los Angeles, has acquired the Scott Paper Box Co. plant at Little Rock, Ark. Arkansas aluminum, for automotive and hardware specialties, will be one of the chief materials used by the Yoder firm, said to be a $1,500,000 a year enterprise which employs 100 persons.



What's YOUR problem?

R. R. Rowlands of Standard Oil's La-Crosse, Wisconsin, office is the lubrication specialist who helped this midwest paper mill (see left) solve a serious problem by recommending STANOGEAR EP Lubricant.

Standard's lubrication specialists are located throughout the Midwest. One of them is within easy reach of your plant. You can contact him simply by phoning your local Standard Oil Company (Indiana) office. His experience and special training will help you get maximum benefits from STANOGEAR EP Lubricant and other outstanding products such as:

SUPERLA Greases—Available in a wide range of consistency grades and in both lime-soap and soda-soap types. SUPERLA Greases cover a wide range of operations. These efficient products are comparable in quality with the highest type of special greases.

STANOLITH Greases—Because these unique lithium soap products possess the heat resistant properties of soda-soap greases and the water resistant properties of lime-soap greases, they offer a solution to lubrication problems caused by the presence of both heat and water.

CALUMET Viscous Lubricants—On open gears and wire rope, these greases strongly resist washing and throw-off. Their superior wetting ability affords better coating of gears, better lubrication of wire rope.

STANORUST Rust Preventives—The eight grades of STANORUSTS form one of the most complete and effective lines of rust preventives on the market today. Each has been scientifically and specifically developed for its intended use. The grades range from a fingerprint remover to a heavy grease type product that protects against corrosion for years under the most severe outdoor exposure.

lelps gear units keep their teeth...

HEAVIER LOADS and higher speeds brought trouble to 16 large gear units used for iving paper machines at a midwest paper mill. nder the more punishing conditions of temperture and pressure, the lubricant in the gear sets teriorated rapidly and had to be replaced every ree to four months. Of even greater concern to lant operators was the pitting of gear teeth surces—a real threat to uninterrupted operation f paper machines and to plant economy.

The problem was put to a Standard Oil lurication specialist. He pointed out that the bricant in use did not have the extreme-ressure characteristics necessary to maintain rong, protective films of oil in the face of high ar loads. Upon his recommendation, the gear ses were drained and cleaned, then filled with TANOGEAR EP Lubricant.

In two years of continuous operation—24 ours a day and 6 days a week—the original fills f STANOGEAR EP have shown no appreciable eterioration and have not needed to be reaced. Plant officials report that the gears show no measurable wear, that pitted surfaces are polished and in excellent condition, and that gear cases are clean.

STANOGEAR EP
REG. U. S. PAT. OFF.
Lubricant

Why not utilize the Standard Oil service employed so successfully by this company? The combination of expert engineering and high quality products can help you solve a specific problem or gain greater all-around economy. How you can put this service to work for you, quickly and easily, is explained at the right.

Standard Oil Company (Indiana), 910 South Michigan Avenue, Chicago 80, Illinois.

STANDARD OIL COMPANY (INDIANA) STANDARD

Paper Chemicals Dept. of Amer. Cyanamid Meets

A meeting of the Paper Chemicals Department, Industrial Chemicals Division, of American Cyanamid Co., New York, was held at the firm's Stamford Research Laboratories on February 14, 15 and 16. All field technical service men were present, as were several district manager and plant managers.

The men discussed the latest marketing picture of the paper industry, as well as new Cyanamid developments to improve paper and paper manufacture.

LATEX HANDLING, STORAGE and laboratory facilities formerly owned by Latex Distributors, Inc., and located at 1075 Hull St., Baltimore, have been purchased by Latex and Rubber, Inc. The purchaser will deal in centrifuged hevea latex, low viscosity natural rubber and high tensile natural rubber.

A NEW BRANCH OFFICE HAS BEEN opened by Allis-Chalmers' general machinery division at Peoria, Illinois. Manager of the new office is Stanley E. Bovim, Chicago district office sales representative for the firm since 1933, and associated with the company since 1923.

Sutherland, Inc., Perfects New Pulp-Washing System

A new and highly efficient stock washing system has been perfected and is now offered to the industry by Sutherland Incorporated, Trenton, N. J., which will provide complete sales and service engineering for the equipment.

Unique in design, The Pressure Washing System uses pressure instead of vacuum to remove liquor from the pulp. Among the advantages reported are high capacity; low power consumption; complete absence of foam; clean washing, with low wash-water requirements; space saving, through compactness of units; and flexibility of installation.

AS A MAJOR STEP IN the expansion of company facilities for manufacture of chemicals, plastics and synthetic rubbers, United States Rubber Co., New York, has purchased the Buna-N synthetic rubber plant of Esso Standard Oil Co., Baton Rouge, La. The purchase price has not been disclosed.

Paper Cups Necessary to Defense—Survey Shows Paper Preference 70.2%

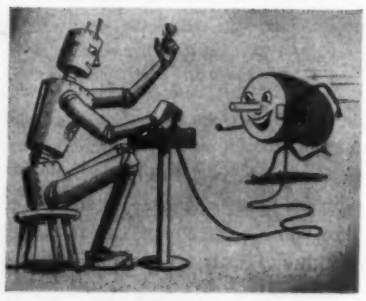
Enlistment of paper cups in defense, war and disaster preparedness was described in a statement to the stockholders of Lily-Tulip Cup Corporation. It was stated that "should disaster strike, should water be contaminated or not available, should glassware or crockery be shattered, single service cups, to administer medicine, to feed people and help prevent disease would be virtually indispensable and would be needed in large quantities."

The importance of paper service as emphasized not only by the recent Fact Finders Survey (showing a 70.2 per cent preference for paper), but by the current emergency which calls for ever-increasing supplies in military and defense activities, for hospitals and all vital services.

Lily corporation's vice president, Fen K. Doscher, states "paper cups and containers are being used more and more by the Army, Navy, hospitals and civilian defense services."

G-E Offers Course of Training in Motor Selection & Application

Equipment for a new educational program designed to aid in rapid training of industrial personnel in the selection and application of modern electric motor drives is being distributed this month to all district offices of General Electric, Schenectady, N.Y. The fifteenth in the company's "More Power to America" series, the course kit consists of nine 35 mm. black and white slidefilms, student review booklets on each lesson, and a complete instructor's manual. Student booklets will be given to those attending the classes for home review, and include reprints of slidefilm scripts with key pictures, and sets of test questions.



"Adjustable speed drives come closer to taking the human element out of speed control than any other device, and they can be controlled by a wider variety of automatic systems than any nonelectric drive." (Excerpt from script of G-E Course, Lesson No. 7)

G-E engineers will conduct the courses to interested groups throughout the country; additionally, the entire instruction kit—nine slide-films, one instructor's manual, and ten copies of each of the nine student booklets, packaged in a luggage-type carrying case—may be purchased from the company for $100. Additional instructor's manuals and student booklets are available at nominal cost.

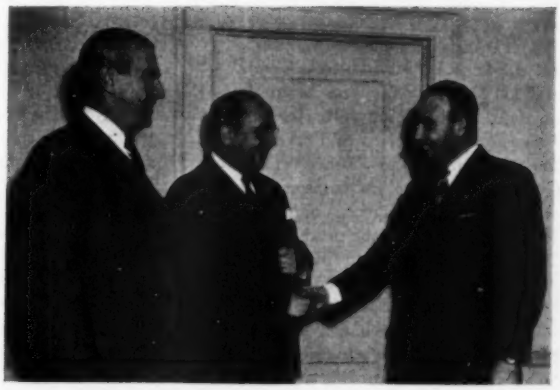
The Motor Selection and Application Course is designed so that any competent engineer can teach students how to select the right motor for any job; specifically, the course shows how motors operate, what types are available, and how to select and apply the right motor for a particular job.

The Paper Industry Pictured Highlights

THOMAS B. McCABE has returned to the presidency of Scott Paper Co. after serving as chairman of the Federal Reserve Board in Washington since 1948. (See Names in the News)

THE JACKS (Junior Aid Conservation Klub) organized by Hinde & Dauch Paper Co., Sandusky, O., has solved the local wastepaper shortage. Students in public and parochial schools win Klub membership cards for bringing wastepaper to school during the drive. Each card is good for free events including extra movies. Mayor ex officio H. G. Schaeffer presents cards to Ann Rutledge of public schools, and to Henry Pfanner, Jr., of parochial schools.

PRESIDENT'S CUP, highest award given annually by Fairbanks, Morse & Co. (Chicago), was bestowed outside the continental limits of the United States for the first time. Robt. H. Morse, Jr., company president (right) presents Cup to Paul A. Suess (left), manager of the Mexico City branch.



GREETINGS EXTENDED by Vice Presidents L. J. Doyle and G. W. E. Nicholson (two at left) when A. P. Acton (right), sales manager, of Australian Paper Manufacturers visits New York City offices of Union Bag & Paper Corp. Mr. Acton thought the use of paper bags for merchandising ice was "astounding."

"FOR VALIANT AND HEROIC CONDUCT," Ulysses Davis (right) receives certificate of merit from J. Maynard Dickerson, of Ohio Industrial Commission. Mr. Davis, an employee of Mead Corp., Chillicothe, Ohio, saved the life of one employee and avoided probable accident to others.

EVERY COURSE SERVED IN PAPER cups and dishes was the unique feature of this dinner demonstration of all paper service during meeting of the New Jersey Food Service Executives Association, which took place at the Robert Treat Hotel, Newark. Lily Tulip Cup Corporation, sponsor of the event, believes in dramatizing the theme "People prefer paper" (See Industry News). Lily-Tulip is co-operating with other members of the paper cup industry in voluntary stockpiling of 25,000,000 cups in public warehouses near "primary target areas" for disaster use.

What about cotton stalk pulp?

A. J. ERNST, H. M. SUTCLIFFE and S. I. ARONOVSKY*

▶▶▶ COTTON STALKS have received considerable attention for a number of years as a possible raw material for the pulp and paper industry. Experimental work published in 1925 (*1*) indicated that the stalks required long cooking periods and the paper made from the pulp was weak and of coarse appearance. Pulping of the entire cotton plant has been suggested, (*2*) but the results obtained were insufficient to give a clear evaluation of cotton stalks as a papermaking material (*3*). More recent work (*4, 5*) on the preparation of cotton stalk pulps for corrugating and fine paper gave relatively low yields of pulp and indicated high cooking chemical requirements.

The annual production of cotton stalks for the period 1937-1948 was about 11,000,000 tons, based on an estimated yield of about 1000 pounds of stalks per acre from 22,000,000 acres of harvested cotton. Seven states—South Carolina, Georgia, Alabama, Mississippi, Arkansas, Louisiana and Texas—accounted for about 83 per cent of the production, with Texas alone producing more than 4,000,000 tons, or nearly 20 per cent of the total (*6*).

The cotton plant has a woody stalk two to four feet tall above the soil line, and is branched near the top. A cross-sectional view of a stalk shows a central pithy core surrounded by a relatively thick layer of woody tissue, which is covered in turn by a bark-like sheath. The stalk tapers from a diameter of about ½ inch at the base to ⅛ inch near the top. The relative proportion of woody tissue decreases from the base to the top while the reverse is true of the pithy core, which constitutes a relatively large portion of the cross-sectional area of the top of the stalk but is practically nonexistent at the bottom and in the roots.

After the cotton has been picked, the stalks are generally cut and plowed back into the soil by a special procedure. Some fertilizer value as humus is developed in this manner, but the large amount of woody tissue in the relatively thick stalk tends to make the transformation of this material into humus a rather slow process.

The stalks can be harvested with a combine and baled with a pick-up baler; however, suitable low-cost methods for collecting and baling the stalks have not yet been developed. Information on the storage characteristics of baled cotton stalks is also lacking. The recently developed method of chemically defoliating the top of the plant before removing the bolls results in stalks fairly free from leaves. These defoliated stalks should have more value for paper pulp since the leaves contribute little or no fiber of any merit.

It has been suggested that after the cotton is picked, the field, after it has been acted on by frost, is plowed in such a way that the roots of the cotton stalks are loosened in the soil to the extent that a pick-up baler can go through the field and bale up the whole plant including the roots. It is claimed that cotton stalks harvested in this way contain not more than 2 per cent dirt, nor more than 18 per cent moisture (*7*).

In response to a number of inquiries received at the Northern Regional Research Laboratory concerning the papermaking qualities of cotton stalks, samples were obtained and pulped in accordance with the methods developed at the Laboratory for wheat straw, modifying the procedures where necessary. This report discusses the results obtained from the preliminary cooks on cotton stalks.

Raw material

Three samples of cotton stalks from the 1946 crop were obtained from the Delta Experiment Station, Stoneville, Mississippi. They were labeled DEL 11A, Stoneville 2B, and Coker 100 Staple. The stalks were practically free from cotton, and included the roots which comprised approximately 20 per cent of the total weight of the stalks. They were relatively clean and free from leaves. The proximate chemical analyses of these stalks and one of wheat straw, included for comparison, are given in Table 1.

The analytical data show that the cotton stalks contained considerably more lignin but less ash, pentosan, and cellulose than are found in wheat straw. There was some variation in amounts of the constituents found in the different samples of cotton stalks, but these variations were not very large. Somewhat larger differences were found between the roots and stalks of the same plant than between the different plants, as indicated in Table 1. The roots showed a greater solubility in hot water and in 1 per cent caustic soda, and they also had lower lignin contents.

Pulp preparation and testing

Most of the experimental cooking was carried out on the Stoneville 2B variety, with some on the Coker 100 Staple whole stalks. The amount of the DEL 11A variety available was insufficient to carry out pulping tests. The small amount of soil clinging to the roots of the stalks was removed by washing with water, and the whole stalks were then chopped in an ensilage cutter to a length of 1 to 2 inches.

In order to conserve the available material, an orienting series of six 100-gram cooks were carried out in an oil bath at 170 C. for two hours, using 15 to 40 per cent kraft chemicals (2 parts NaOH-1 part Na_2S), based on the dry material. The cooked stalks were washed, defibered mechanically, and screened over an 8-cut plate. Since the cooks made with 20 and 25 per cent of cooking chemicals produced the largest yields of screened pulp in this series, the range of 20-25 per cent chemical was chosen for the larger cooking trials.

Most of the cooks were made using a 3-pound charge of cotton stalks in a 10-inch diameter spherical, steam-jacketed autoclave. The ratio of total liquid to stalks was 7:1 and the cooking period was 2 hours at 170 C. (100 psi), with approximately 20 to 30 minutes required to attain the cooking temperature and about 20 minutes to reduce the pressure in the autoclave to atmospheric. Two cooks were also made in a larger (8-pound capacity) cylindrical tumbling autoclave and the charges were blown from the autoclave at the end of the cook. The majority of the cooks were made by the kraft and neutral sulphite processes, with one by the soda process.

After removal from the autoclave, the cooked stalks were washed, and defibered in a 5-pound laboratory beater with approximately 0.02 inch clearance between the roll and bedplate. The washed material was then screened on an 8-cut flat screen, the accepted pulp being run over an inclined 100-mesh wire to remove the fines and to thicken the

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pulp. The pulps blown from the autoclave were sufficiently defibered by this action to require no additional breaking up in the beater prior to screening. The data on pulping conditions and yields and on the physical and chemical characteristics of the pulps are given in Table 2, where they are compared with the results obtained on wheat straw pulp. All of the pulp tests were made in accordance with the TAPPI standard methods, or modifications previously described (8).

Neutral sulphite pulp

It is evident from the data in Table 2 that, under the conditions used in these experiments, the neutral sulphite process produced only fair pulps from cotton stalks. Although the yields of crude pulp are in the same range as that obtained from wheat straw by this process the cotton stalks required considerably more cooking chemical. Much less screened pulp and more screenings were obtained from cotton stalks than from wheat straw. The cotton stalks also produced more fines (material lost through the inclined 100-mesh wire in thickening the screened pulp). The yields of cotton stalk pulp decreased somewhat, as expected, with increasing time of cooking and with increasing concentration of cooking chemicals. The inconsistencies apparent in the yields of screened pulp, screenings and fines from the cotton stalks are probably due, at least in part,

TABLE 1—Proximate chemical analysis of cotton stalks

Sample no. (U.S.D.A.) / Material		No. 5472 Cotton stalks (U.P.I. 11A)	No. 5474 Cotton stalks (Coker 100 Staple)	No. 5473 Cotton stalks (Stoneville 2B)			No. 4682
				Whole plant	Roots	Stalks	Kanrale wheat straw
Chemical analyses[1]							
Moisture	%	7.4	9.2	9.4	8.6	9.6	8.3
Ash	%	3.0	2.4	2.5	3.4	2.7	6.3
Extractives							
Alcohol-benzene (1:2)	%	5.4	2.8	2.6	4.8	1.9	2.5
Hot water	%	5.9	7.6	6.4	9.8	6.2	10.0
1-percent NaOH	%	25.2	28.4	27.0	31.4	25.4	41.2
Lignin	%	26.2	25.8	26.0	22.5	26.6	16.8
Pentosans	%	23.5	21.8	22.0	21.9	22.6	31.9
Cross and Bevan cellulose (ash free)	%	50.1	47.7	47.2	50.5	44.6	54.7
pentosans in C. & B. cellulose[2]	%	25.6	22.0	24.6	24.4	23.5	27.0
Alpha-cellulose	%	35.1	33.5	33.0	35.8	30.8	37.3
pentosans in alpha-cellulose[3]	%	4.7	2.4	3.1	3.8	3.6	4.2
Holocellulose	%	—	61.7	62.7	62.8	64.6	69.2

(1) All values except moisture on oven-dry basis. (2) Based on C. and B. cellulose. (3) Based on alpha-cellulose

TABLE 2—Pulping cotton stalks: cooking conditions, yields, and chemical and physical properties of pulps

Cook no.	Material	Cooking conditions: Chemicals[1]		Time of cooking	pH of liquor: Initial	Final	Pulp yields[1]: Crude	Screened	Screenings	Fines	Chemical constants[2]: Ash	Pentosans	Lignin	$KMnO_4$ no.	Bleaching: Chlorine consumption[2]	Brightness (Hunter)	Bleached pulp yield[1]	Beating and strength characteristics: Beating time 500 ml. (S. R.)	Basis weight (24x40-500)	Bursting strength	Tensile strength	Tear resistance	Folding endurance (Schopper)
		%	%	Hrs.			%	%	%	%	%	%	%		%	%	%	Min.	Lbs.	Points/ream lb.x100	G./ream lb.	G./ream lb.x100	Double folds
		Na_2SO_3	Na_2CO_3						Neutral Sulfite Pulps														
548-550	Wheat straw	8.0	8.0	2	10.4	7.1	61.5	55.5	1.3	4.8	7.7	28.7	8.1	16	6.8	70	55.7	42	48	80	180	86	870
551	Stoneville 2B cotton stalks	26.0	6.0	2	---	8.2	68.6	48.5	6.9	8.3	2.3	22.7	16.6	41	16.6	58	44.0	42	48	78	172	62	380
552	"	26.0	6.0	4	---	8.8	57.6	48.0	5.9	6.6	1.8	22.6	13.5	17	---	---	---	33	48	81	172	61	360
630	"	30.0	6.0	2	---	8.9	61.5	42.0	9.2	10.3	2.6	22.7	16.9	40	11.8	60	36.0	30	46	77	172	64	360
		NaOH	Na_2S						Kraft Pulps														
560	Wheat straw	8.0	4.0	2	---	10.6	53.3	47.1	0.8	5.4	4.7	29.4	5.4	15	5.9	70	43.7	26	46	102	177	77	980
629	Stoneville 2B cotton stalks	13.3	6.7	2	11.8	10.7	46.6	40.4	2.6	5.8	3.0	28.6	7.8	8	22.7	70	32.6	42	48	92	180	80	760
631	"	13.3	6.7	4	11.7	10.1	46.1	39.3	0.7	6.1	3.4	21.6	5.9	28	18.1	70	33.5	44	48	99	180	71	820
569	"	16.6	8.4	2	---	11.1	44.5	42.1	0.2	2.2	4.0	21.6	5.6	16	7.0	64	39.5	48	48	99	188	78	1000
9673/	"	16.6	8.4	2	---	10.7	48.4	45.4	0.8	1.7	4.2	21.2	6.2	19	18.3	70	37.7	42	48	96	172	70	700
9668/	Coker 100 Staple cotton stalks	16.6	8.4	2	---	11.0	42.3	39.8	0.6	1.6	3.7	20.7	5.3	18	23.3	70	34.1	48	48	91	178	64	680
9662/	"	16.6	8.4	2	---	11.0	44.8	42.1	0.3	2.5	4.6	20.7	6.0	19	22.9	70	34.1	37	48	99	178	77	700
									Soda Pulp														
560	Stoneville 2B cotton stalks	26.0	---	2	---	11.6	44.6	40.0	0.4	4.2	2.7	20.9	6.7	20	14.8	70	36.6	58	47	92	188	68	760

(1) Based on oven-dry raw material. (2) Based on oven-dry unbleached pulp. (3) Blown

to the varied degree of defibering given unblown cooked stalks in the beater prior to screening.

The cotton stalk pulps had moderate strength characteristics, somewhat lower than those obtained from neutral sulphite wheat straw pulp. An increase in cooking time or in cooking chemical apparently had little effect on the strength properties of these cotton stalk pulps. It may be noted here that the bursting and tensile strengths and folding endurance of the neutral sulphite cotton stalk pulps were superior to those obtained from pulps of similar woody plant stems, such as soybean stalks. This is probably due to the larger amount of relatively long bast fibers in the outer sheath of the cotton stalks.

The relatively high lignin content and permanganate number, and the poor bleachability of the cotton stalk pulps indicate the rawness of these pulps as compared with the wheat straw neutral sulphite pulp. The high lignin content is probably a contributing factor to the relatively low strength characteristics of these pulps. Here again the increase in cooking time or in chemical concentration, with the other conditions constant, had but little effect on the chemical constituents of the cotton stalk pulps.

Better pulps were obtained from cotton stalks by the kraft process than by the neutral sulphite method, but the kraft pulp yields were considerably lower than those obtained by the less alkaline pulping method. Here, also, lower yields of pulp were obtained from cotton stalks than from wheat straw, although the latter material was cooked with only half the chemical required for the cotton stalks. As indicated by the crude pulp yields in Table 2, an increase in time of cooking or in concentration of kraft chemical resulted in a decreased yield of cotton stalk pulp.

Kraft pulp

The proximate chemical analyses of the cotton stalk kraft pulps show decreasing lignin content with increased time of cooking or with increased cooking chemical. The pulps obtained with 20 per cent kraft chemicals contained more lignin than the wheat straw pulp produced with only 12 per cent chemicals, under the same conditions of pulping. The permanganate number and bleach consumption of these pulps varied almost directly with the lignin content. The increased chemical concentration or time of cooking apparently had but little effect on the ash or pentosan content of these pulps.

The strength characteristics of the cotton stalk kraft pulps, with the exception of the pulp produced by cooking two hours with 20 per cent kraft chemicals, were approximately the same as those of the wheat straw kraft pulp. It should be noted that the kraft pulps were stronger, particularly in bursting strength and in folding endurance, than the neutral sulphite pulps. The cotton stalk kraft pulps were somewhat harder, however, than the wheat straw pulp as indicated by the longer time required to beat the cotton stalk pulps to a freeness of 500 ml. SR.

The results obtained with the kraft pulps from the Coker 100 Staple cotton stalks were quite similar to those produced from the Stoneville 2B material, indicating little difference between these two varieties of stalks. The pulp made with caustic soda was quite similar in all respects, including yield, chemical analysis, and strength properties, to the kraft pulp. Since only one soda cook was included in this study, however, it is not feasible to generalize upon the comparative properties of soda and kraft cotton stalk pulps.

A comparison of the rotary-cooked pulp with the blown pulp, produced under similar conditions of time, temperature, and concentration of chemicals, shows that there is no essential difference between these two types of pulping. This was also found true in connection with the pulping studies in this Laboratory on wheat straw and on other agricultural residues.

General considerations

It is evident from these results that suitable pulps for fine specialty papers can be produced from defoliated cotton stalks. The strength properties of such pulps, particularly those made by the alkaline processes, compare favorably with wheat straw pulps prepared under similar conditions. Better pulps can be prepared from cotton stalks by the kraft or soda processes than by the neutral sulphite process. The yields of pulp from cotton stalks are, however, considerably lower than those obtained from wheat straw. Since the fibers from the woody portion of the cotton stalks are fairly similar to those from the woody tissue of soybean stalks, hemp hurds, flax shives, and similar materials, it follows that the superior strength of the cotton stalk pulp is probably due to its content of relatively long bast fibers from the bark-like sheath of these stalks.

As in the case with certain other fibrous agricultural residues, the technical problems involved in producing suitable paper pulp from cotton stalks are not the only problems that have to be solved in order to make this a successful commercial venture. A sufficient amount of raw material to keep a pulp mill in continuous operation throughout the year must be available within a reasonable distance from the mill. This involves collection, storage, and preservation in storage of the raw material for the better part of a whole year, at a cost low enough to make pulp mill operation profitable. Such economical raw material procurement has already been pretty well worked out in the cases of sugarcane bagasse and the cereal grain straws. For cotton stalks, however, an efficient economical method of harvesting has not yet been developed; neither is there sufficient information available on suitable economical methods of preserving the stalks in storage. It is apparent, therefore, that until such time as these data and information are available, cotton stalks will not be considered as a prime raw material for paper pulp manufacture and will be used only in emergency periods as a temporary substitute for other papermaking fibers.

Summary and Conclusions

1. Cotton stalk pulps were prepared by the kraft and neutral sulphite processes and compared with wheat straw pulps produced under similar conditions.

2. Cotton stalk pulps produced by the neutral sulphite method had lower strength properties than those of neutral sulphite wheat straw pulps.

3. Kraft pulps, prepared from cotton stalks, had strength properties quite similar to those of wheat straw kraft pulps.

4. With both processes, higher yields of pulp were obtained from wheat straw than from the cotton stalks.

5. Considerably more cooking chemical was required for cotton stalks than for wheat straw.

6. The economics of producing cotton stalk pulps are discussed briefly.

7. It may be concluded that, even though the cotton stalk pulp may be technologically suitable for paper making, commercial production of such pulp will depend to a very large extent upon the development of suitable economical methods of collecting these stalks and preserving them in storage.

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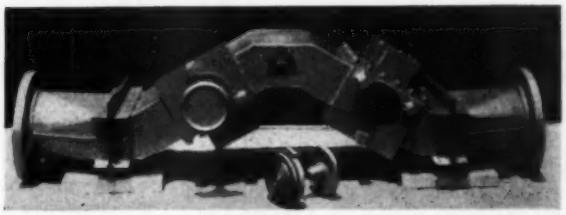
Magnetic separators protect equipment by removing tramp iron

GORDON RICHARDSON
Eriez Manufacturing Co.

TRAMP IRON on three plate magnets. These magnets were installed in the bottom of a DeZurik regulator between the brown stock washers and Sutherland refiners in a kraft board mill in the South. Note the amount of tramp iron in relation to the cigarette package



Eriez magnetic hump for removing tramp iron from slush pulp

▶▶▶ SEMICHEMICAL pulping systems are being installed by many pulp mills at the present time. The use of this type of system, however, requires the semi-cooked chips to be defibered before washing or screening. It is thus necessary to remove "tramp iron" before it has a chance to damage refiners and other subsequent equipment. However, tramp iron removal is important to all types of pulp and paper manufacture because it helps prevent costly maintenance.

One answer to this problem is the use of magnetic separators, particularly those of the permanent type which require no electricity to generate their magnetism. When these are judiciously placed in processing lines the possibility of tramp iron passing through to cause costly breakdowns is virtually eliminated.

A complimentary protective device is the electronic metal detector. Any material passing between the search coils of this machine will be searched electronically for any metal. Even a particle so small as 0.039 in. in diameter will trigger a bell, light or other warning device, or will stop a conveyor entirely. This is particularly suited to protection of chippers. If logs travel on belt conveyors to the chippers, tramp metal of all kinds can be spotted by a detector that is so installed as to include in its field the belt and its burden.

After the chipper, plate magnets or a magnetic pulley can be used on the dry wood chips to keep iron from getting into the digesters. The magnetic pulley is just what the name implies: a pulley for belt conveying systems into which has been built a permanent magnet.

Damage to pumps and refiners can be minimized by installing either high-capacity, oversize plate magnets or a magnetic pressure tight hump unit. The latter is a device which interrupts line flow by means of baffle plates and its hump-shaped design. It incorporates plate magnets at two points to assure efficient purging in the area where flow is slowed up. The unit will withstand 45 psi.

One paper manufacturer in New York State has been using two Eriez pressure-tight humps on its paper slurry lines. The company estimates that savings of $1000 per month have resulted because damage to jordans has been virtually eliminated.

One newly developed separator that is especially valuable, because of its self-cleaning ability, is the Eriez magnetic slurry-cleaning drum. The unit consists of a revolving smooth-faced cylindrical shell within which there is a stationary, high-powered permanent magnet. The magnet creates a field of magnetic attraction over about one-half the area of the drum.

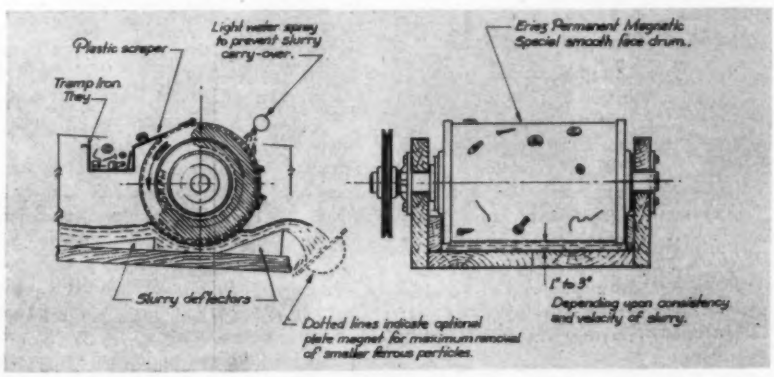
Installations vary, of course, but in principle the separation is accomplished as follows. All slurry passes across the surface of the revolving shell. The iron contamination in the slurry adheres to the shell surface as it revolves because of the magnetic field created from within the drum. This force of attraction is powerful enough to pull the tramp iron out of the slurry.

After rotating for about one-half revolution, the adhering iron is out of the magnetic field. It slides off the shell surface into a collecting tray, thus completing the automatic purging operation.

If further assurance of the removal of smaller iron particles is desired, a plate-type magnet can be installed directly after the drum. The slurry passes over the face of this separator and final separation is fully efficient.

A typical installation of this magnetic drum was made at the Ohio Boxboard Co., Rittman, O., in a distribution box. Its function is to remove both large and small tramp iron contamination.

Manufacturers in the magnetic separation field have given much time and effort to the development of special equipment for the paper industry. Their success is mirrored by the fact that 75 per cent of all paper manufacturers, and a proportionate number of pulp and felt processors, are using magnetic separators to cut machinery damage.


Plastic scraper
Light water spray to prevent slurry carry-over.
Tramp Iron Tray
Eriez Permanent Magnetic Special smooth face drum.
Slurry deflectors
Dotted lines indicate optional plate magnet for maximum removal of smaller ferrous particles.
1" to 3"
Depending upon consistency and velocity of slurry.

Eriez slurry cleaning drum for use in open troughs

Training chemical engineers for the pulp & paper industry

LYLE C. JENNESS*
University of Maine

▶▶▶ THE SCOPE OF technological developments in the production of pulp and paper is illustrated by the following advancements in production. A few years ago, paper machine speeds of a few hundred feet per minute were considered normal. Machines are now in production that operate at 2500 to 3000 fpm with predictions of still higher speeds for the future. Improvements have been made in machine coating and calendering of paper since the last war that have not only resulted in ease of production but have greatly improved the quality characteristics of the finished product.

These developments only have been possible by assurance of better and more efficiently manufactured raw materials and accessory equipment. It is fortunate that this situation has resulted from research investigations by both the producers of pulp and the suppliers of chemicals and auxiliary equipment.

Engineering opportunities

The typical pulp and paper mill finds an opportunity to utilize the trained chemist, physicist, mechanical engineer, civil engineer, electrical engineer, and chemical engineer. The distribution of these trained men varies with the type of mill and extent of its operations. In an integrated mill of 200 or 300 tons per day capacity, it is common to find from 15 to 20 chemical engineers, 10 to 12 electrical or mechanical engineers, several chemists, and some civil engineers and physicists. Since there are approximately 900 pulp and paper mills in the United States, it is obvious that the industry can use many young engineers with some specific knowledge of the pulp and paper processes. These young men are in demand not only as a result of recent advances of the industry but in anticipation of necessary future improvements.

Although much has been accomplished, further scientific and technological advances must be made to solve the waste disposal problems. We must also learn more about the structure of cellulose and lignin, two major constituents of the raw material, and the changes they undergo in the various processes. Such information must be applied through engineering to allow an economic solution of waste disposal problems, the more efficient recovery of heat and chemicals, and the utilization of other types of wood in order to correct the current depletion of this natural resource that is taking place in some areas.

It is, therefore, believed that there are exceptional opportunities in this field for young engineers with some specific knowledge of the pulp and paper processes. Although much "on-the-job" training is done in this industry, it is looking more and more to technical schools as a source of man power. There are very few schools that provide this opportunity, and they are described by E. C. Jahn of the New York State College of Forestry (*1*). Courses have been initiated subsequent to presentation of his paper at Western Michigan College, Kalamazoo, Michigan, and at Lowell Textile Institute, Lowel, Massachusetts.

It is interesting to note that the educational approach is different at each of these schools. The program at the Institute of Paper Chemistry is confined to the graduate level. The courses at Syracuse University are administered by the New York State College of Forestry and utilize training in chemistry and chemical engineering from service departments of the University. It is the practice at the University of Maine to provide specific training in the pulp and paper field integrated with basic courses within the department of chemical engineering. Dr. Jahn states, "The program at Maine is a fine example of the approach to pulp and paper technology through chemical engineering."

How chemical engineering fits in

The importance of chemical engineering in the production of pulp and paper, and the more important applications of it to this process, have been discussed recently by G. W. E. Nicholson (*2*). Some of these applications include the Unit Operations of Flow of Fluids, both Newtonian liquids and suspensions; steady state and unsteady state Heat Transfer; Gas Absorption by both physical and chemical mechanisms; Filtration; Evaporation; Drying; Extraction; and Distillation.

In addition to these operations a variety of chemical process is employed in the production of pulp and paper. The combustion of sulphur, for instance, must be accomplished to produce sulphur dioxide with a minimum amount of sulphur trioxide. Chlorine and caustic are manufactured by electrolysis. Pulp resulting from the chemical, or mechanical, treatment of wood must be suitably bleached by one of several chemical processes. In some cases recovery of waste cooking liquor involves calcination, causticization, washing and settling operations. In any case the utilization of waste liquor requires the operation of evaporators and chemical and heat recovery equipment including the generation of steam. The possibility of further processing waste liquors for the production of vanillin, ethanol, lignin derivatives, yeast, adhesives, and drugs, may result in a series of chemical processes that will constitute an industry by itself.

It is obvious that combinations of these physical and chemical phenomena present ideal opportunities for the application of recording and control instruments, a field of general interest to the chemical engineer. There are also many opportunities in this field of production to apply the principles of chemical engineering and economic balance.

Training program at Maine

It is reasonable, therefore, in a state which ranks second in production of pulp, and seventh in production of paper and paper board, that the course in chemical engineering at the State University should take advantage of this process. This is being done at the University of Maine without sacrifice of emphasis on basic fundamentals.

A curriculum that is optional for students who expect to specialize in this field contains lecture and laboratory courses that are specific to the process in the last year of the program. These courses require a basic knowledge of chemical engineering thermodynamics, stoichiometry, unit operations, mathematics, physics and analytical and physical chemistry. The specialized courses also include regularly scheduled mill inspections, lecture programs sponsored by representatives from industry, and the theory and practice of the manufacture of pulp and paper.

Various research projects are prosecuted which require an application of physical chemistry, thermodynamics, principles of combustion, economic balance, and plant design. Brief mention of some of these would include the economics of evaporation of ammonia base waste sulfite liquor and its subsequent combustion, spray drying of this liquor or treatment of it for recovery of ammonia by pyrolysis or ion exchange; an investigation of the measurement of sur-

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face area and zeta potential of various paper making fibers; the relationship of surface properties of fibers to their ability to absorb sizing materials and fillers; the adaptation of pulping and bleaching processes to types of wood not in common industrial use at present; and various problems in the utilization of equipment for these operations including the important field of corrosion.

Nearly six hundred University of Maine alumni are listed as being actively engaged in the production of pulp and paper or allied service industries. Approximately one third of this group had extensive undergraduate specialized training in this field. A nearly equal number pursued a general undergraduate course in chemical engineering. Recognizing the need for trained men in this field, this group of alumni has fostered the initiation of a five year program including a major in chemical engineering and a minor in business administration. The object of this particular curriculum is to train men for eventual positions of management in the pulp and paper and allied industries.

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Carbon dioxide system reduces fire hazards

W. E. MORGAN, JR.
Walter Kidde & Co., Inc.

▶▶▶ WHERE VOLATILE, flammable solvents are used in coating, laminating and impregnating paper or fabric, a dangerous fire hazard exists. To overcome such a fire hazard, Synthane Corp., Oaks, Pa., called in Walter Kidde & Co. to devise a safe, dependable fire extinguisher system for its coating machine. A carbon dioxide fire smothering installation now eliminates the threat of serious fire, yet does not interfere with or alter operation of the machinery.

To produce various grades of Synthane different types of paper, cotton, asbestos or glass fabric are impregnated with synthetic resins in an alcohol solvent. The fabric or paper passes over a series of rolls, through the resin bath and finally into a drying oven. Later, the treated rolls of filler are cut to workable sheet size and the sheets laminated in big presses, whence they emerge as Synthane plastic. The solvent-resin bath, contained in an open tank, constitutes a fire hazard.

Although the impregnating bath is kept below the critical temperature of the alcohol solvent, there is constant danger of flash fire in the escaping fumes, which might be ignited by static electricity or a spark. Because of the rapid spread and intense heat of such a fire, manual methods of extinguishment would be far too slow and limited to prevent serious damage to the machines, material in process, surrounding plant area and personnel.

The Kidde extinguishing system is an automatic one which stands guard 24 hours a day over the hazard area. Typical of the three separate extinguishing systems protecting Synthane's machines is one served by a bank of 50 lb. capacity carbon dioxide cylinders. Carbon dioxide is stored in the cylinders as a liquid under pressure of 850 psi. The cylinders have automatic valve release mechanisms, and they are manifolded together for simultaneous discharge.

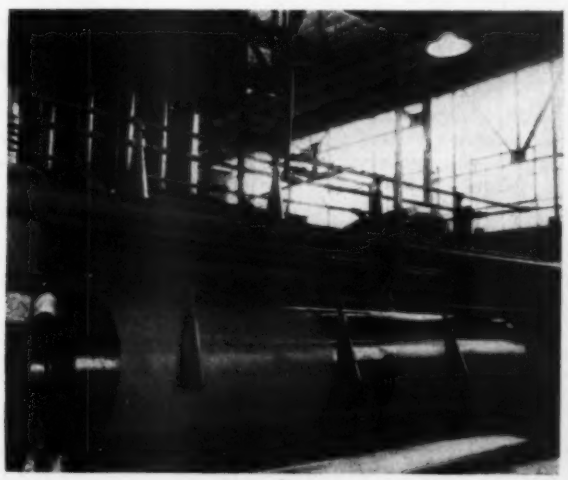
Nerve center of the extinguishing system is a link-type heat detector located above the impregnating bath. Should fire break out in the inflammable bath, the detector automatically actuates the cylinder release mechanism.

When released from the cylinder bank, the carbon dioxide discharges through a series of ten nozzles aimed directly at the surface of the impregnating bath. As it hits the air the carbon dioxide becomes a gas, expands to 450 times its stored volume, and completely envelops the surface of the bath, machinery rolls, and the fabric being treated.

By excluding air from the fire area, the inert gas kills the fire quickly and safely. Being inert, the carbon dioxide cannot adulterate the chemical bath, or harm the machine or fabric passing through, and it leaves no messy residue after extinguishment.

As an added safety feature the Kidde system protecting Synthane's impregnating machines throws an explosion-proof switch which shuts down all electrical machinery. A manual release, located near the cylinder frame, can be used to operate the system when that is desirable.

Fires on the coating machine are quickly smothered by carbon dioxide gas discharged by Kidde fire protection system



Bank of cylinders (upper left) supply carbon dioxide to the nozzles aimed at surface of resin-alcohol dip tank

Stainless steels in pulp and paper equipment

H. O. TEEPLE
The International Nickel Co.

▶▶▶ THE POSITION OF austenitic stainless steels in the pulp and paper industry is quite firmly established. This is based upon the generally excellent performance of these materials in resisting corrosion by the various media encountered in the industry. However, these chromium-nickel-iron alloys, like other materials used for resisting corrosion, are economically suitable only when properly applied. Since there are several different classes of stainless steels, namely, austenitic, martensitic and ferritic, care should be exercised in the choice of a particular steel for a given application.

The purpose of this discussion is to indicate those applications of the austenitic stainless steels as a class which by virtue of their respective corrosion resistant properties are the most suitable materials.

Some of the more commonly used stainless steels, i.e. chromium-nickel-iron alloys of sufficient alloy content to be truly "stainless," are shown in Tables 1 (a) and 1 (b) and in Table 2. Those shown in Table 1 are the wrought alloy compositions and those in Table 2 are cast compositions.

Mechanical pulping

The use of stainless steel in the mechanical or ground-wood pulp process is largely associated with the handling of the raw pulp and subsequent stock preparation. Some groundwoods are more corrosive than others and for critical parts the use of 18-8 stainless steel is usually quite desirable. An indication of the suitability of 18-8 stainless in comparison with carbon steel and cast iron is shown by the corrosion data in Table 3.

These data serve to illustrate the general high level of the resistance of these stainless steels to corrosion by groundwood pulps and stocks. Pitting is seldom an influential factor and generally the 18-8 steels are adequate. There are some cases, however, where stock or pulp may accumulate and under these circumstances some local attack may be observed.

The austenitic stainless steels can be used for certain grinder parts, screen plates, pulp conveyor parts and for other critical applications. In many cases iron contamination is a problem, particularly where the groundwood is to be subsequently bleached by sodium peroxide, by zinc hydrosulphite or by other agents.

Because of the nature of the corrosives involved, the stainless steels have useful application in the production of pulp by the sulphite and sulphate or kraft processes. Such applications will be discussed further in detail indicating the usefulness of the stainless steels by showing applicable corrosion data.

Sulphite pulping

The use of stainless steel, especially Type 316, is well warranted in the sulphite process, particularly with regard to the cooking liquors. Such liquors have compositions which vary from mill to mill but essentially the liquor is a dilute solution of calcium bisulphite containing 5—8 per cent total SO_2 of which about 1—1½ per cent is combined and the balance being free SO_2. The current trend appears to be toward the higher concentrations.

The preferred stainless steel for handling sulphite cooking liquors is the chrome-nickel-molybdenum alloy, such as Type 316. The chrome-nickel-molybdenum alloys are more resistant to corrosion by the sulphite liquors, especially in resistance to pitting, than are the 18-8 alloys. Wherever there is a likelihood for some of the sulphurous acid to be oxidized to sulphuric acid, and where there is likelihood of scale formation such as in the case of the calcium base liquors, the use of Type 316 is preferred. Some corrosion data are given in Table 4 showing the usefulness of the chrome-nickel-molybdenum alloy in contact with sulphite liquors.

It will be noted in both test results shown in Table 4, there was no pitting indicated for any of the stainless steels. The absence of pitting on the chrome-nickel-molybdenum alloys is to be expected. In the case of the straight 18-8 alloys, the absence of pitting in these two cases is not to be assumed as criteria of the equivalence of this alloy to the chrome-nickel-molybdenum alloy in resistance to pitting. General experience with the 18-8 alloys and the chrome-nickel-molybdenum alloys in sulphurous acid applications indicate that the 18-8 alloys cannot be relied upon to show absence of pitting under those conditions where Type 316 stainless does show an absence of localized attack.

The use of the chrome-nickel-molybdenum alloys in the calcium base sulphite process has extended to lining sulphite digesters. Such an application has many merits and H. A. Schmitz, Jr. (*1*) reported that two such digesters have been in service for approximately six years and a recent inspection of the interior showed the lining to be unaffected by the severe corrosion conditions. Further, a Type 316 stainless steel lined digester, 15 ft. diameter by 56 ft. high, was installed in the early part of 1947 in a calcium base sulphite paper mill on the west coast (*2*). A specification of 0.03 per cent carbon maximum was carefully followed to avoid the necessity of a solution heat treatment of the vessel after fabrication. Since that time other alloy lined or alloy clad digesters have been installed. Service experience accumulated to date on these several digesters has served to indicate the fact that the chrome-nickel-molybdenum stainless steels are suitable for this application.

In recent years there has been an interest in using magnesium base (*3*) and ammonia base sulphite liquors, the main reason for the interest being the waste liquor disposal problem. Both these newer cooking liquors produce waste liquors which after being concentrated may be burned thus eliminating the waste liquor disposal problem. In the case of the magnesium base, most of the magnesia may be recovered as well as the sulphur values. The use of the chrome-nickel-molybdenum alloys would

TABLE 4

(A) Field Test for 28 days in Calcium Base Sulphite Cooking Liquor containing 7.87% total SO_2, 6.82% free SO_2 and 1.05% combined SO_2. The operating temperature was 291° F.

Material	Indicated Corrosion Rate IPY
Type 304	0.00008
Type 316	0.00009
Type 317	0.00012
Killed Mild Steel	10.96
Cast Iron	1.78

(B) Field Test for 55 days in Calcium Base Sulphite Cooking Liquor containing 8.23% total SO_2, 7.02% free SO_2 and 1.21% combined. The operating temperature was 270° F.

Material	Indicated Corrosion Rate IPY
Type 304	0.00004
Type 316	0.00006
Type 317	0.00006
Killed Mild Steel	Greater than 0.20*
Cast Iron	Greater than 0.54*

*These specimens corroded entirely away during the exposure period.

TALBE I (a)

Composition and Mechanical Properties*** of Wrought Chromium-Nickel-Iron Alloys Frequently Used in the Pulp and Paper Industry

ASTM Designation	ASTM Grade	Nearest AISI* Type No.	Chemical Composition					
			Cr	Ni	C	Mn**	Si**	S**
A167-44	2	302	18.00-20.00	8.00-10.00	.08-.20	2.00	1.00	.030
A240-49	S	304	18.00-Min.	8.00-Min.	.08 Max	2.50	0.85	.030
A167-44	8	309	22.00-24.00	12.00-15.00	.20 Max.	2.00	3.50	.030
A167-44	10	310	24.00-26.00	19.00-22.00	.25 Max.	2.00	2.00	.030
A240-49	M	316	17.00-Min.	10.00-Min.	.08 Max.	2.50	0.85	.030
A240-49	T	321	17.00-Min.	9.00-Min.	.08 Max.	2.50	0.85	.030
A240-49	C	347	17.00-Min.	9.50-Min.	.08 Max.	2.50	0.85	.030
		316 Cb	18.00-19.00	13.00-14.00	.08 Max.	1.5	1.0	.04

TABLE I (b)

ASTM Designation	p**	Other	Forms Available (See Note Below)	Tensile Strength Mpsi	Yield Strength 0.2% Offset Mpsi	Brinell Hardness	Thermal Coef. Expansion 32-212°F.
A167-44	.035		B,R,S,W,T,P	80-90	35-45	135-185	9.6 x 10^{-6}
A240-49	.035		B,R,S,W,T,WT,P	80-90	35-45	135-185	9.6 x 10^{-6}
4167-44	.035		B,R,S,W,P	90-110	35-45	170-200	8.3 x 10^{-6}
4167-44	.035		B,R,S,W,P	90-110	40-50	145-210	8.0 x 10^{-6}
A240-49	.035	Mo-2.00 Min.	B,R,S,W,T,WT,P	80-90	35-55	135-185	8.9 x 10^{-6}
A240-49	.035	Ti-5xC Min., 0.60% Max.	B,R,S,W,T,P	80-90	35-45	135-185	9.3 x 10^{-6}
A240-49	.035	Cb-10xC Min., 1.0% Max.	B,R,S,W,T,WT,P	80-90	35-45	135-185	9.3 x 10^{-6}
	.04	Mo-2.0-2.25 (2.25 Preferred) Cb-0.60-0.90 (Tentative Composition)					

(*) American Iron and Steel Institute, (**) Maximum values, (***) Values of Mechanical and Physical Properties refer to the annealed condition; ASTM Special Technical Publication No. 52A, May 1950. AISI Specifications—Section 24, P. 9, Feb., 1949. Form Available: B, Bars; R, Rod; S, Sheet; W, Wire; T, Seamless Tube; WT, Welded Tube; P, Plate. Most compositions also available as clad.

TABLE 2—Composition (a) of Cast Chromium-Nickel-Iron Alloys Frequently Used in the Pulp and Paper Industry

ASTM Designation	ASTM Grade	ACI (b) Designation	C*	Mn*	P*(c)	S*(c)	Si*	Cr	Ni	Mo	Other
A296-49T	CF20	CF20	0.20	1.5	0.05	0.05	2.0	18.0-21.0	8.0-11.0		
A296-49T	CF8	CF8	0.08	1.5	0.05	0.05	2.0	18.0-21.0	8.0-11.0		
A296-49T	CH20	CH20	0.20	1.5	0.05	0.05	2.0	22.0-26.0	12.0-15.0		
A296-49T	CK20	CK20	0.20	2.0 (d)	0.05	0.05	2.0	23.0-27.0	19.0-22.0		
A296-49T	CF8M	CF8M	0.08	1.5	0.05	0.05	2.0 (e)	18.0-21.0	9.0-12.0	2.0-3.0	
A296-49T	CF8C	CF8C	0.08	1.5	0.05	0.05	2.0	18.0-21.0	9.0-12.0		Cb.8XC to 1.0 Max.

(*) Minimum Values, (a) ASTM Special Technical Publication No. 52A, May, 1950, (b) ACI Designations, 1949, (c) ACI Designates 0.04% Max., (d) ACI Designates 1.5% Max., (e) ACI Designates 1.5% Max.

TABLE 3—Corrosion Tests in Groundwood Pulping (Rates in IPY)*

	18-8 S.S.	Type 316	Mild Steel	Cast Iron
1. Knotter Screen, 103° F., 61 day test	0.0001	.....	0.007	.....
2. Decker Feed, 105° F., *p*H 4.8, 93 day test	0.0001	0.0001	0.007	0.008
3. Washer, 125° F., *p*H 4.1, 30 day test	0.0002	0.0001	0.007	0.009
4. Filter Feed, 110° F., *p*H 5.0, 51 day test	0.0001	0.0001	0.012	0.014
5. Screening Filtrate, 110° F., *p*H 4.6, 52 day test	0.0001	0.0001	0.023	0.025
6. Pulp Grinder Stock, 170° F., 28 day test	0.0001 (P)	0.0001	0.034	0.045

*IPY—Inch Penetration Per Year.
(P)—Specimens pitted to a depth of 0.007" in 28 days.

TABLE 5—Plant corrision test at fan inlet of absorber tower

(Process involved is absorption of sulphur dioxide in sodium carbonate solution.)

Material	No. of days	Temp.	Indicated corrosion rate (IPY)
Type 316	45	160° F.	0.0010
Type 310	45	160° F.	0.0001
Chemical Lead	45	160° F.	0.0030

TABLE 6—Plant corrosion test

(Sulphate black liquor of 32° Be.)

Material	No. of days	Temp.	Indicated corrosion rate (IPY)
Type 304	39	200° F.	0.0001
Mild Steel	39	200° F.	0.010
Cast Iron	39	200° F.	0.019

TABLE 7—Summary of plant corrosion data

Corrosive	*p*H	T° F.	Days	Indicated Corrosion Rate (IPY) 18/8	Type 316	Cast Steel	Cast Iron
Sulphite—Blow pit	3.5	77	84	.0001	.0001	.....	.23
Sulphite—Knotter screen	4.3	44	75	.0001	.0001	.009	.008
Sulphite—Beater chest	4.7	65	84	.0001	.0001	.....	.003
Sulphite—Jordan chest	6.0	84	76	.0001	.0001	.....	.....
Sulphite—Flat screens	6.1	35	48	.0001	.0001	.002	.002
Sulphite—Save-alls	4.7	62	84	.0001	.0001	.....	.007
Newsprint—Deckers	4.0	95	52	.0001	.0001	.....	.037
Newsprint—Machine headbox	4.2	60	95	.0001	.0001	.009	.013
Neutral Sulphite—Stock washer	7.2	110	82	.0001	.0001	.....	.....
Sulphate—Diffuser	....	150	349	.0001	.....	.002	.011
Sulphate—Beater chest	7.9	46	98	.0001	.0001	.....	.006
Sulphate—Machine headbox	6.8	90	43	.0001	.0001	.033	.038

be expected to be satisfactory in the case of these cooking liquors but since these applications are relatively new, it would seem wise to develop applicable corrosion data on particular mill conditions. In a progress report on magnesia base sulphite pulping (4) R. E. Baker mentioned the use of stainless steel in the evaporators in liquor recovery operation.

These chrome-nickel-molybdenum alloys are used almost exclusively for acid lines, valves, fittings, pumps and blow lines. The service performance of these alloys have demonstrated their merit for these corrosive applications.

One of the pulping processes to gain recent widespread attention is the neutral sulphite semichemical. This process is being used in those areas where large stands of certain hardwoods are available, for example in the South. The liquor is made by absorbing SO_2 in a sodium carbonate solution which is subsequently adjusted to a *p*H 7 with caustic soda. H. J. Perry (5) described this process in considerable detail.

The use of the neutral sulphite process in the pulping of straw for straw paper manufacture is of recent interest and was outlined by C. G. Krancher (6).

The austenitic stainless steels are useful in equipment used for liquor making. This is illustrated by corrosion data shown in Table 5.

Stainless clad steel is used for the construction of the continuous digesters.

Sulphate pulping

The stainless steels have considerable application in the sulphate process. Normally the straight 18-8 chrome-nickel alloys are sufficient for service in this pulping process. These applications include relief valves, blow-off valves and lines, indirect heater tubes, cooking liquor lines, pumps, valves, and fittings. In addition to these, the austenitic stainless steels have application in the liquor recovery systems, such as tubes in the strong liquor evaporator effects, tube sheets, crown coverings in the vapor space, liquor downtakes, transfer pumps and lines.

In recent years, a considerable amount of interest has been evidenced in the use of the chrome-nickel steels for sulphate digester service. While the corrosion rates of the austenitic stainless steels as determined by weight loss measurements are low enough, i.e. 0.0005 IPY, to permit their use, these steels have been found by experience to be susceptible to stress corrosion cracking under specific circumstances. LaQue and Clarke (7) in a review of corrosion problems encountered in the alkaline pulping industry summarized the studies made to date on this subject.

It has been found that all of the austenitic stainless steels commonly used in the pulping industry, i.e. Types 304, 347 and 316, are about equally susceptible to stress corrosion cracking. The conditions leading to such failures appear to include the concentration of alkaline cooking liquor in crevices. This is evidenced by the fact that in failures that have occurred, the cracks have originated on the shell side. Tests (8) have shown that Inconel (Reg. U.S. Pat. Office) is not susceptible to stress corrosion cracking in sulphate cooking liquors, even when concentrated in crevices.

While it is believed Inconel has certain advantages over the austenitic stainless steels for sulphate digesters, most of the alloy lined or alloy clad steel digesters installed in recent years have utilized the austenitic stainless steels, particularly Type 347. Some failures have been experienced but others have performed satisfactorily.

The problem of the choice of suitable materials of construction for digesters is of considerable importance and much test work is under way. Gaulke and Scheil (9) presented a detailed discussion of a useful co-operative testing program with reference to wood pulping. Their main conclusion was to the effect that the solution to digester corrosion problems is not simple and by means of a co-operative test program the chances are good that a reasonable solution to the problem can be found.

The use of austenitic stainless steels is quite prevalent in the liquor recovery systems in the sulphate pulping industry. Evaporator tubes in the strong liquor effects are almost universally welded Type 304 stainless. Black liquor transfer lines, valves and fittings are generally 18-8 stainless steel. Special austenitic stainless steels are used for transfer pumps handling the hot strong black liquor. Service life up to 10-15 years have been reported for some of these applications. An indication of the serviceability of 18-8 stainless in these instances is shown by data in Table 6.

In the production of paper from pulp, there are many applications of stainless steel. The corrosion rates shown by these alloys are quite low, of the order of 0.001 IPY or less. Some uses of stainless are indicated in the following summary. Where a special type stainless is preferred for the particular service, it is so indicated. Otherwise, the 18-8 chrome-nickel alloy will usually suffice.

A. Pulp preparation

1. Pulp washers, covers, fittings
2. Perforated and slotted screen plates. Some trouble has been experienced with fatigue failures of the stainless slotted screen plates, but at present some especially designed slotted plates have been developed which alleviate this difficulty to some extent.
3. Pulpers and agitators
4. Decker covers and fittings
5. Beaters, refiners, machine linings
6. Jordan fillings
7. Stock lines

B. Papermaking

1. Stuff boxes or linings
2. Head boxes or linings
3. Slices
4. Save-all pans
5. Cylinder vats, molds
6. Doctor blades
7. Stock lines

C. Bleaching

1. Covers on pulp washers, vats, fittings for direct chlorination, acid and alkaline bleached pulp
2. Agitator blades and shafts

(Type 316 stainless is the preferred alloy for the above applications.)

3. Stock lines carrying washed bleached pulp

D. Miscellaneous

1. Hot alum tanks, lines, valves and fittings. Type 316 stainless is usually preferred
2. Color preparation equipment
3. Coating machine troughs

The serviceability of the austenitic stainless steels is presented in Table 7.

In conclusion, an attempt has been made to point out some instances in the pulp and paper industry where the austenitic stainless steels have particular merit. Their usefulness is based primarily upon their generally excellent resistance to corrosion by the media encountered. Other applications undoubtedly will require special consideration and it should be emphasized that the successful use of the chosen alloy will depend to a large extent upon the care exercised in the analysis of the problem.

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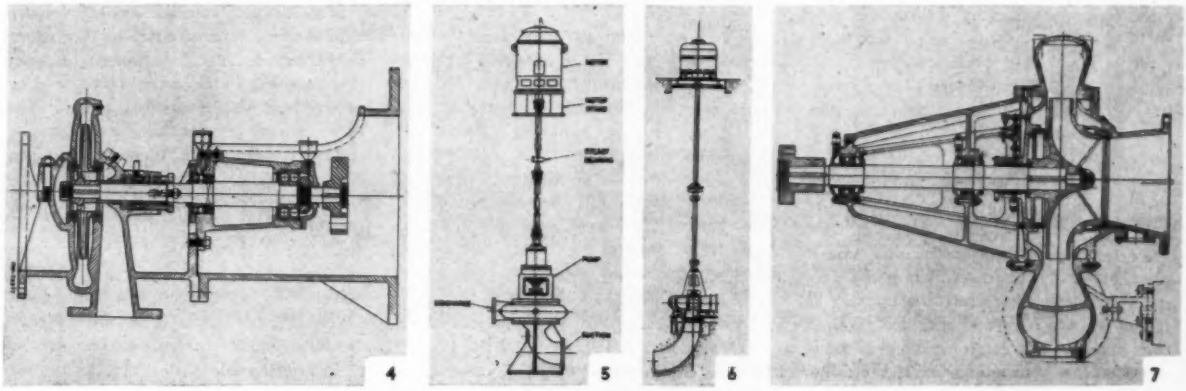
Fig. 1—Vertical pump with direct mounted motor; Fig. 2—Vertical bottom suction volute pumps (piloted couplings); Fig. 3—Vertical double-suction volute pump with direct mounted motor



Section of vertical pump with top suction inlet propeller (Fig. 4); Typical elevation of vertical pump with tubular shafting (Fig. 5); with solid shafting with motor supporting rotating parts (Fig. 6); Section of vertical bottom suction pump with twin volute (Fig. 7)

Centrifugal pumps . . .

Part 12 of a series . . . vertical dry pit pumps

IGOR J. KARASSIK AND ROY CARTER
Application Engineers
Worthington Pump & Machinery Corporation

▶▶▶ VERTICAL SHAFT centrifugal pumps can be divided in two classes: dry pit and wet pit, the former operating in air and the latter submerged or partially submerged in the liquid supply.

Many of the large condenser circulating pumps, large water supply pumps and marine pumps, as well as most of the small, medium and large vertical sewage pumps, medium and large drainage and irrigation pumps for medium and high head, are of the dry pit type with external bearings. In a few cases the vertical design is desired because of reduced floor space, as in the case of marine pumps. In other cases it is desirable to have the pump at a low elevation because of suction conditions but also desirable to have the motor or driver at a high elevation. In large capacity pumps, the vertical type is generally used because, when all factors are considered, it is more economical than the horizontal type.

Many vertical dry pit pumps are basically horizontal designs with minor modifications, generally in the bearings, to adapt them for vertical shaft drive. The reverse is true for small and medium size sewage pumps as the vertical type is the most popular for that service. Most of these small and medium size sewage pumps have elbow suction nozzles, Figure 1, as the suction supply is usually from a wet well adjacent to the pit in which the pump is installed. Generally, the larger sewage pumps as well as the larger drainage, irrigation, condenser circulating and water supply pumps are of the vertical bottom suction type, Figure 2. Except for sewage service, these other services occasionally can best employ a vertical double suction type of pump, Figure 3.

When a vertical pump is desired for condensate service or other applications for which the eye of the impeller must be vented to prevent vapor binding, a pump with bottom single-inlet impeller is not suitable, as it does not permit effective venting. This is likewise unattainable for the lower eye in a vertical pump employing a double suction impeller. For such vertical pumps the most suitable design would be one with a top single-inlet impeller as shown in Figure 4.

When the driver of a vertical dry pit pump can be located immediately above the pump, it is often supported on the pump itself, as in Figures 3 and 5. The shafts of the pump and driver may be connected by a flexible coupling, in

Material from this article will be included in a book on centrifugal pumps now being prepared by the authors; hence, all rights to republication are reserved by the authors.

which case each must have its own thrust bearing. In other cases the pump shaft is rigidly coupled to the driver shaft or is an extension of the driver shaft and a common thrust bearing, generally in the driver, is used.

When the driver of a vertical pump is to be mounted some distance above the pump, intermediate shafting must be used to connect the pump and the driver. The design of this shafting depends on the power to be transmitted, the speed, the total length and the bearing design used in the pump and motor.

Connecting shafting

The shafting connecting its driver and a small or medium size centrifugal pump is now usually of the universal-joint type with hollow tubing. (Figure 5) The lower section has a universal joint at both ends while the upper sections, if more than one section is used, has a guide bearing supporting the lower end and a universal joint at the upper end.

This type of shafting compensates for angular misalignment and, as the lower section also incorporates a splined joint, also compensates for any minor discrepancy in length. When speed permits their use, shaft sections up to 120 inches in length can be obtained. Longer sections are too easily sprung in handling to make their use advisable. This shafting does not transmit thrust so that the pump and driver must each have a thrust bearing. Usually the driver is supported above the supporting floor on a stand permitting access to the flange and upper universal joint for bolting up the flanges and re-lubrication. The driver must be of the solid shaft type or, if of the hollow shaft type, must be provided with a head shaft guided by a lower bearing to act in the same capacity. Except for the lowest universal joint, the weight of this shafting is carried on the motor. Except for extremely long shafting installations, the total weight involved is relatively small and a normal thrust motor can be used. Actually this is a more expensive type of shafting than solid shafting but as the basic universal joint has a larger field of application on automobiles and trucks, it is more a production item and thus actually less costly.

For intermediate shafting for units requiring more torque than can be carried by the available universal-joint type of shafting, solid shafting is used either with solid couplings or with flexible type couplings. If solid or rigid couplings are used, only one thrust bearing, usually in the driver, is needed and all other bearings are merely guide bearings. This type of shafting has the disadvantage that all the bearings of the unit must be in accurate alignment which is difficult of attainment with open shafting if more than three bearings are involved.

Solid vertical shafting using flexible couplings usually consists of shaft sections (including pump and driver) each with two or possibly three bearings connected by floating shaft sections with a piloted or guided flexible coupling at each end, thus acting in effect like a universal joint. (Figure 2) Naturally each section with bearings has to have one bearing acting as a thrust bearing to carry the weight of the shaft section.

The intermediate shafting for large pumps which require large shafts is usually of the solid type with solid couplings generally of the flanged type and in many cases forged on the shaft sections. (Figure 6)

The size of the shafting used for an installation may be determined by the torque to be transmitted or if a certain span between bearings is desirable because of existing supports (floors or beams) a shaft larger than required by the torque may be necessary so that the operating speed will be sufficiently below the critical period. In this connection, it is general practice to have the first critical speed above any operating or runaway speed of the pump.

The critical speed of a vertical solid shaft is a direct function of the diameter and an inverse function of the square of the span between bearings. Thus for a shaft running at twice the speed of another, the diameter of the first shaft has to be twice as large in diameter for the same bearing span or its permissible bearing span will be reduced to 70 percent of that permissible with the lower speed.

Bearings

The bearings for vertical dry pit pumps and for intermediate guide bearings are usually of the antifriction type, grease lubricated to simplify the problem of retaining the lubricant in a housing having a shaft projecting vertically through it. In larger units where antifriction bearings are not available or desirable, self oiling or forced feed oiled bearings with a separate oiling system are used.

It is important that the supports for the guide bearings of vertical shafting connecting a centrifugal pump and its driver be sufficiently rigid. The radial load is usually assumed to be the same as if the unit was in a horizontal position. With this loading in any direction the deflection should not exceed

$$\Delta = (187.7/n_c)^2$$

where Δ = deflection in inches and n_c = critical speed of the shafting, usually 125 percent of the pump rotative speed or some value above the possible runaway speed in case of back flow thru the pump. In case beams or channels are used to support the bearings, their design is naturally dependent on their span, the radial force and the permissible deflection.

Small pump installations with short spans generally require a single channel to which vertical surface mounting bearings are most easily attached. Larger units with long span often require fairly widely spaced channels or beams with strengthening lattice work. With this latter type of bearing support, a horizontally mounted guide bearing resting directly on the beams or on a bridging plate is more convenient. Thus the tendency to use vertical mounted guide bearings for smaller units and horizontally mounted guide bearings for larger units.

Structurally, vertical dry-pit centrifugal pumps are similar to horizontal shaft pumps. It is, however, to be noted that many of the very large vertical single-stage single-suction (usually bottom) volute pumps which is the preferred type for large storm water pumpage, drainage, irrigation, sewage and water supply projects have no comparable counter part in the horizontal shaft type. The casings of such pumps are basically of the U section which is structurally weak, thus often necessitating heavy ribbing in order to make the casing sufficiently rigid.

In comparable water turbine practice a set of vanes (called a speed-ring) between the casing and runner is employed to act as struts. While such a speed-ring does not adversely affect the operation of a water turbine, in a pump it would function basically as a diffuser with the inherent hydraulic limitations of that construction. Some of the high head large pumps of this type have been made of the twin-volute design. The wall separating the one volute and the passageway of the other from the tip of the volute to the discharge nozzle acts as a strengthening rib for the casing thus making it easier to design a casing strong enough for the pressure involved (Figure 7).

Vertical pumps with bottom single-inlet impellers have a leakage joint between the wearing ring hub of the impeller and the suction head. When pumps of this type are handling gritty water, during the periods of shutdown the grit separates out and concentrates at or near this joint. When the pump is again started, this concentration of grit is washed thru the leakage joint with resulting wear. With large pumps a ring construction as shown in Figure 7 is feasible; this involves extending the stationary ring above the suction head forming a pocket in which the grit will be deposited and from which it can be periodically flushed. Such and other refinements are feasible in large, but not in small, pumps.

Paper and paperboard making—XIV

HARRY WILLIAMSON

Cylinder Machine . . . The Overflow type vat-4

AT THE CLOSE OF Part 3 on the Overflow Type Vat (Installment XIII, March, 1951), we stated that "the problem of controlling any one of the three velocities of liquid volume flow without interfering adversely with either of the other two is apparent."

The 3 velocities

(1) Velocity of the APPROACH flow *from* the mixing box *to* the supply pool in the making board area at the entrance to the circle.

(2) Velocity of liquid volume flow IN or THROUGH the formation circle.

(3) Velocity of water drainage THROUGH the wire mesh in the ACT of forming individual fibers into a homogeneous sheet of paper.

Number *three* is PRIMARILY controlled by the stock preparation, is SECONDARILY controlled by the SUCTION or MOLD head (the differential in liquid level between the inside and outside the revolving cylinder mold), and is partially AFFECTED by the velocity of liquid flow in the formation area in relation to the rotating speed of the formation unit.

No. *two* is PRIMARILY controlled by the adjustment of the overflow slice regulating the height of the OPPOSING liquid column in the BACK circle, secondarily controlled by regulation of the liquid level in the mixing box, directly increased or decreased by change of stock freeness changing demand rate of initial formation in the operation of the counterflow type vat, partially affected by freeness change in the operation of the overflow type vat, and partially affected by the change in ratio of velocity flow speed of liquid volume to rotation speed of the forming unit.

Number *one* is PRIMARILY controlled by the difference in height between the liquid level in the mixing box and the liquid level in the supply pool at the making board; in the operation of the overflow type vat is SECONDARILY controlled by the adjustment of the overflow slice; it is partially *affected* by change in volume RATE DEMAND, caused by either change in stock freeness or thickness, points caliper, of sheet to be formed. The velocity rate flow speed of this supply volume is decreased or increased by definite design of and in the various compartments and piping systems through which it flows to the supply pool. Complete dispersion of fibers throughout the carrying water medium at point of delivery, the supply pool, is the function of this APPROACH velocity. The baffle boards, perforated rolls, velocity constriction

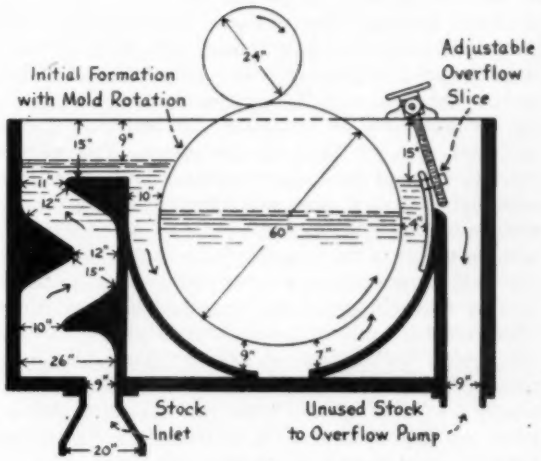


Fig. 3—General arrangement "overflow" vat. Scale 1/20 in.—1 inch

throats, expanded areas are designed to alternately *slow down* the velocity and then speed it up again to a progressively *diminishing* velocity flow speed so that on arrival at the supply pool velocity of the liquid volume is *zero* and certainly should *not exceed* three fps.

Now, suppose we examine Figure 3, showing a general arrangement of the overflow type vat, and note the details of design to control as far as possible these three velocities.

No. 1 approach flow velocity

The delivery piping from the mixing box to the bottom center of the rear compartment of the vat is 20 inches in diameter and, by use of a reducer, the actual delivery pipe connected to the vat is only nine inches in diameter. Two things are accomplished in this manner. First, by having a large diameter feed pipe large volumes of water can be carried at *low* velocity and, therefore, *entrainment* of air by the liquid volume is greatly minimized. Entrained air, when released from pressure, causes bursting air bubbles which in turn cause violent eddies and currents resulting in UNEVEN DISTRIBUTION of the fibers. Should this source of liquid disturbance occur in the relatively shallow area of the supply pool it would be very difficult to control the even delivery of the mixed volume at the entrance to the formation circle. Secondly, by reducing the piping cross section area from that of a 20-inch diameter pipe to the cross sectional area of a nine-inch diameter pipe at the *immediate* entrance to the vat bottom compartment, velocity of flow is *rapidly increased*. This violent liquid action results in the breaking up of any flocculation of fiber

bundles which may have occurred in the lower velocity and relatively gentle flow of the mixed volume through the 20 inch diameter piping system.

The width of the receiving compartment is 26 inches and the vertical height is divided into continuous sections of free access to each other by solidly constructed, curved, directional baffles. The first of these baffles is arranged directly over the nine inch delivery pipe and projecting beyond the center of the compartment to form a velocity throat with the rear wall of the vat of only 10 inches in width. Up to this point the approach flow of liquid volume has traveled through piping of 314.16 square inch cross sectional area, reduced to piping of an area of 63.617 square inches and then rapidly expanded into a section of vat compartment 26 inches × 132 inches or a cross sectional area of 3432 square inches. The vertical velocity force of the liquid volume emerging from the nine-inch delivery pipe is deflected by the curved surface of the baffle towards the rear wall of the vat and the whole of the liquid volume is distributed over the 3432 square inches of cross sectional compartment area in a swirling, circular, intermingling turbulence which creates a most thorough DISPERSION of the fibers throughout the liquid mass as individual units in suspension. By this entrance into a compartment area nearly 11 times greater than the nine-inch delivery pipe, the approach velocity of flow entering the ten-inch velocity throat is *greatly reduced.*

In this design of vat this is the *last* section of deliberately created violent turbulence with the objective of insuring fiber distribution and dispersion. From the time the liquid volume emerges from the ten inch velocity throat to the actual delivery of the liquid volume to the supply pool at the entrance of the formation circle the objective is to MAINTAIN the dispersion of fibers achieved and deliver the mixed volume to the supply pool in even, regular, continuous flow which will be nearly as possible quiescent as it mingles with the supply pool liquid volume.

From the ten-inch velocity throat, the mixed volume (guided by the curved surfaces of the baffles) flows upwards and at an angle of a mean of 45 degrees to the right. Between the guiding baffles, this section of the vat compartment gradually expands from the ten inch throat to a cross section width of 15 inches. By gentle flow impact with the inside vertical wall of the vat, the flow is again changed to a vertical direction to pass through the second velocity throat which has a cross sectional width of 12 inches. The curved surfaces of the baffles now guide the flow upwards and at a mean of 45 degrees to the *left.* The width of this last angled section of the compartment is 12 inches, the same width as the secondary velocity throat. By gentle impact with the vertical back wall of the vat the liquid volume assumes vertical flow direction to pass through the last of the vertical throats. This last constriction of flow area from 12 inches to 11 inches is for the purpose of slightly accelerating the flow speed, a last little impetus to velocity, preparatory to the final change of flow direction from the vertical to the horizontal flow over the making board area which forms the bottom of the supply pool.

Such is the function and action of the APPROACH FLOW VELOCITY. From expansion to contraction—first violently turbulent and from then on only enough acceleration to the liquid volume to MAINTAIN the even distribution and dispersion of the individual fibers in the mixed volume from which the sheet of paper is formed.

No. 2 velocity passing through the circle

The modern cylinder paperboard machine has to make a wide variety of paperboards and, as we are dealing with various degrees of stock freeness, various units of caliper thickness of sheet formed per mold; all of such operating factors require individual TIME RATE OF WATER DRAINAGE, then the VOLUME requirement per minute must be changed to meet the individual requirements of *each* grade made. Under these circumstances it is obvious that the fixed design, piping, baffle boards, compartment sectional area, etc., which are not adjustable *cannot* be arranged to meet every required volume and end the approach flow delivered to the supply pool at nearly zero velocity. Unless other means of control are available then the velocity of the approach flow will have a variable effect on the velocity of the liquid volume in the formation circle. From our study of Figures 1 and 2 showing the operation of the counterflow type vat we know that volume demand changes as the freeness of the stock changes; free stock—more water, slow stock —less water, and such demand change results in a change of the height of the *opposing* liquid column in the *back* circle which in turn changes the *velocity* flow in the formation area. Our operational correction in the counterflow type vat is to shut off or add water; change the *volume* to correct the changed velocity.

In the overflow type vat as shown in Figure 3 we do *not* have to change volume to change velocity of flow in the formation area, the circle. THE OPPOSING LIQUID COLUMN IN THE BACK CIRCLE, the velocity REGULATING COLUMN can be regulated to any height within the operable range of the slice control, the operable range of the available liquid head height in the mixing box, and the operable degrees of circumference of the formation unit, the cylinder mold. Moreover, providing a suitable volume of liquid overflow is maintained, the APPROACH VELOCITY and the FORMATION VELOCITY can be held, for all practical purposes, *steady.* A very wide change in stock freeness, so wide as to be unacceptable in even moderately well controlled operations, *would* be necessary to change flow VELOCITY in the formation area. (This is *not* to say that the *values* of the finished sheet will remain in the same under such wide change of freeness values. It *does* say that although the demand rate of water for formation will increase or decrease, such demand change will *still* be within the limits of the total volume used actually in the ACT of formation and as overflow mixed volume.) Therefore, No. 1 and No. 2 of the big three velocities will *remain* the same and velocity No. 3, drainage of water *through* the wire mesh, will be the *only* one of the big three to change sufficiently to have ANY EFFECT ON THE FINISHED SHEET.

The functional PURPOSE of the slice adjustment is to *fully control* the velocity flow of the mixed volume passing *through* the formation circle, to *partially con-*

trol the approach velocity; used to extremes, it is possible by this means to raise a column head height of liquid volume in the BACK CIRCLE which will eliminate *all* actual velocity of flow in the formation circle except the INDUCED FLOW caused by the drainage of water through the wire mesh in the act of formation. Such *induced* flow would be water volume replacement for water volume used and would be at the RATE OF WATER DRAINAGE and, therefore, under the influence of the SUCTION or MOLD HEAD, the differential in liquid level head height between the *inside* and *outside* the revolving cylinder mold.

Now suppose we examine the details of the supply pool and the formation circle as shown in Figure 3. The making board, which forms the bottom of the supply pool immediately preceding the entrance to the front circle, is 15 inches from the top of the vat. The liquid level of the supply pool is nine inches from the top of the vat and the depth of the pool is six inches.

The FRONT circle is an arc commencing at a distance of ten inches from the face of the revolving cylinder mold and gradually closing this distance until at the completion of the front circle arc this distance is reduced to nine inches. The completion of this front circle arc is at a point seven inches preceding the center of the mold in direction of rotation.

The BACK circle arc commences at a point seven inches past vertical center of the mold in the direction of rotation and at this point the distance of the arc from the face of the revolving mold is seven inches. A further reduction of two inches from the completion of the front circle arc. Continuing to completion, the BACK circle arc culminates at a point level with the horizontal center of the revolving mold. At this point the face of the back circle arc is only four inches from the surface of the formation unit, the revolving cylinder mold. From a ten inch distance, reducing to nine inches, a further reduction to seven inches and a final distance of only four inches from the surface of the revolving mold.

Such are the gradually REDUCING AREAS of the FORMATION CIRCLE, the areas which *hold* the *necessary* liquid volume to *effect* formation as the revolving cylinder mold *revolves through* each stationary area. This gradual reduction of the holding capacity of the formation circle is an *indication* of the progressively diminishing *rate* of formation as the forming unit rotates in the mixed volume from which the paper is formed.

In the operation of the overflow type vat INITIAL formation, the fastest *rate* of formation, occurs in the FRONT circle because the mixed volume flow is in the SAME direction as the rotation of the forming unit. *Newly cleaned* wire mesh, initial formation fastest rate; therefore, water drainage through the wire mesh in the act of formation is in greater proportional volume demand per second of cylinder mold rotation than at any other sectional area of the formation circle. From initial formation to completion of formation the act of formation is at a progressively diminishing rate due to the gradually increasing resistance of the forming sheet to the passage of water through the wire mesh; hence the *demand* rate of liquid volume progressively diminishes towards the completion of *rotation* of the cylinder mold through the formation circle.

The slice control arrangement is an ADJUSTABLE CONTINUATION of the BACK circle. This simply means that in relation to VELOCITY CONTROL the *opposing* liquid level in the back circle may be *regulated* to *counteract* or *accellerate* initial velocity flow.

The supply pool level is shown as nine inches from the top of the vat and the overflow level, after completion of formation, is shown as 15 inches. With the *approach flow* from the mixing box arriving at the supply pool at nearly zero velocity we have a velocity head at the entrance to the formation circle of six inches. Referring to our Velocity Table, we find that six inch head height equals a velocity flow of 5.67 fps, or at the rate of 340 fpm.

Table 3 is arranged to show the theoretical velocity of the liquid volume in relation to MOLD SPEED per minute *only*. This will give the reader guiding figures in conjunction with the figure to study the control effect obtainable by adjustment of the overflow slice. (Note: the relation of velocity flow to FORMATION TIME per revolution will be detailed later.)

TABLE 3—Velocity flow in relation to mold speed

Head height (inches)	Velocity ft./min.	Machine speed—feet per minute				
		300	400	500	550	600
6	340	1.133	0.85	0.68	0.62	0.566
4	278	0.966	0.695	4.556	0.5	0.463
2	196	0.653	0.49	4.392	0.356	0.326
1	139	0.463	0.347	0.278	0.253	0.231
0	0.	0.	0.	0.	0.	0.

Zero differential of liquid head between the INLET of the circle and the OUTLET of the circle is deliberately included in this control table to *stress* that under these conditions there is *no* velocity of flow *in* and *through* the circle other than the *induced* flow from the supply pool as *replacement* volume for the water drained through the wire mesh, or *pushed* through the wire mesh by the differential in liquid levels *inside* and *outside* the molds. This, of course, is number three of the big three velocities, water drainage through the wire mesh. With no differential in liquid level head height between the supply pool and the overflow slice, the APPROACH FLOW VELOCITY, actuated by the liquid level differential between the head box and the supply pool, is *directly* under the control of the overflow slice.

Interrelationship of liquid head heights & velocity flow control

Figure 4 shows the range of velocity flow control and the interrelationship of liquid head heights at the three important points. With the exception of a few designs for specialty papers, all mixed volume supply to the cylinder type machine is by utilizing the force of gravity by differential in liquid head heights in the line of flow. The three liquid levels with which we are concerned are those of:

(1) The liquid level in the MIXING box immediately preceding the vat.

(2) The liquid level in the SUPPLY pool immediately preceding the inlet to the formation circle.

(3) The liquid level at the outlet of the circle,

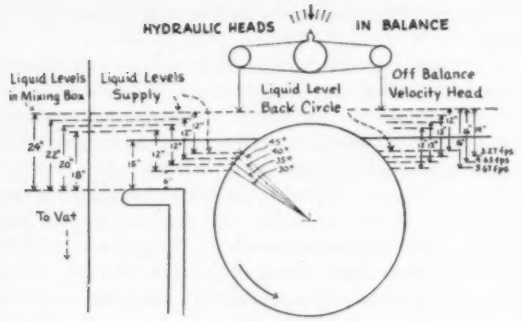


Fig. 4—Hydraulic heads—in balance

which is also the point at which formation is complete and the rotating cylinder mold *emerges* from the mixed volume from which the paper has been formed.

In our discussion of Figure 3 (March, 1951) we noted that all designing of the piping system and the rear compartment of the vat, the units through which the APPROACH flow is delivered to the supply pool, is arranged to meet three specific conditions—to deliver the required VOLUME with the fibers evenly *distributed* to the supply pool at *nearly zero velocity*. We also noted that as *fixed* design these three desirable conditions could *not* be met in entirely *all* the time due to the variety of *demand* occasioned by variety of grades to be made. Some other means of control would have to be evolved.

Figure 4 demonstrates how the use of the slice control overflow combination is designed to provide this desired means of control. As far as control of velocity flow from the liquid level in the mixing box to completion of formation is concerned this design fills *all* the requirements. However, we must also note that to this date of writing (March, 1950) no design of cylinder mold type formation has reached the speed of 600 fpm in continuous commercial operation. Quite obviously, problems other than those of velocity flow remain to be solved before cylinder machine formation of paper will be comparable in linear foot speed production with that of the fourdrinier machine.

One other major point relating to formation may be said to have been accomplished by the use of the slice control overflow combination, and that is much larger volumes of water can be used to effect formation and as a result much lower consistencies at equal running speed can be used. Other factors being equal, we may state that the *lower* the formation consistency of the mixed volume, the *more uniform* the formation. Figure 4 is drawn to the same scale as Figure 3; therefore, direct comparisons can be made. It shows a 60 inch diameter mold, operating overflow type, with making board 15 inches from the top of the vat. To avoid confusion, only detail pertaining to the relative liquid levels and the resultant velocity or balance is shown.

Studying Figure 4 and starting with the lowest liquid level in the mixing box, 18 inches, and reading this in conjunction with the lowest liquid level in the supply pool, six inches, we find that if we delivered this liquid volume from the mixing box on a horizontal plane directly to the making board as shown by the arrow, we would have a mean velocity head in the mixing box of 15 inches. This hydraulic head would impart to the liquid volume a velocity of 8.966 fps or a flow speed of 538 fpm.

We can readily imagine the tremendous swirling, changing current and eddies; rising and falling ripples moving swiftly and shifting constantly across the face of the revolving cylinder mold. In that short distance of travel the impact force alone would be nearly 0.6 pound psi of liquid contact with the wire mesh. Such initial formation which did take place would be incidental and equivalent to that of spraying on with a bucking hose.

However, we do not deliver the mixed volume on a horizontal plane; we flow it through a well designed system of piping and sectional vat compartments. The objective is to continually deliver the required volume to the supply pool as a well controlled liquid volume with the fibers evenly dispersed throughout the mass, the whole to arrive at the supply pool at nearly zero velocity.

As the supply pool is six inches in depth and the hydraulic head in the mixing box is 18 inches, then the differential of 12 inches head—equivalent to a velocity of eight fps—is the amount of force to be *exhausted* in the dispersion of the fibers through the liquid mass and the elimination of currents and eddies in the flowing mixed volume as it is delivered to the supply pool at nearly zero velocity. This 12 inches of hydraulic head can be called the mixing box UNIT of hydraulic equilibrium because if the velocity force as represented by this head is completely exhausted by the passage of the mixed volume through the approach flow system, then the velocity at the liquid level of the mixing box and the liquid level of the supply pool are equal, zero-zero.

We also note that with a depth of six inches in the supply pool, the cylinder mold revolving anticlockwise makes contact with the liquid volume at a point marked 30 degrees from the horizontal center of the mold. As this contact is made, FORMATION COMMENCES; the mold commencing to *submerge* and entering the *front* circle as it continues rotation. Following this line across to the back circle we find that by adjustment of the slice overflow control the setting of this control device permits the surplus mixed volume to overflow *from* the back circle; at point A, 30 degrees, the cylinder mold *emerges from* the mixed volume and formation is complete for that revolution of the cylinder mold.

Using this lowest level operating condition as an example we can readily understand how the APPROACH velocity and the passing through the circle velocity; numbers 1 and 2 of the three liquid flow velocities DIRECTLY affecting formation, can be controlled and, if desired, can be brought into equilibrium with the water actually used to form the sheet.

Example

Liquid levels: mixing box 18 inches, supply pool 6 inches, hydraulic head 12 inches. Mixing box hydraulic head used up by designed resistance of approach flow system. Velocity flow speed at supply pool ZERO.

Commencement of formation: Liquid level 30 degrees mold circumference from horizontal center. Completion of formation, liquid level 30 degrees mold

circumference. No hydraulic differential. Velocity flow *through* formation circle ZERO. Water volume used in effecting formation and water volume in continuous replacement of that used is in equilibrium. Under these circumstances velocity of flow through the approach system can be regulated to the velocity for which the system was designed through the total OPERATING RANGE OF MOLD CIRCUMFERENCE and grade variation demand.

Referring again to Figure 4, we find that by adjustment of the overflow slice control combination we note that this condition of equilibrium can be maintained within the whole range of liquid head heights of operable FORMATION LENGTH round the circumference of the revolving cylinder mold. The maximum formation length of *any* diameter mold is from 45 degrees on the submerging arc to 45 degrees on the emerging arc *regardless* of the direction of rotation of the cylinder mold.

The making board shown in the Figure is 15 inches from the top of the vat and a projection from the center of the mold to the circle edge of the making board would show that this point is equal to 13 degrees from the horizontal center of the submerging mold. Unless we wanted to create still another hydraulic head by having the liquid volume FALL from the making board to the entrance of the circle (sometimes for an extraordinarily BULKY sheet this is done) this point, the level of the making board to an equivalent 13 degrees of the emerging arc, is the MINIMUM formation length of *any* diameter cylinder mold. However, as the length of formation area available is important to time rate of formation and machine speed, it is not considered good operating practice, unless we have a special reason, to deny ourselves the use of the formation length available to our operations. The operating levels shown in the Figure cover the range of good operating practice for the great majority of paper boards made in standard commercial production. They also clearly demonstrate the hydraulic principles governing differential liquid levels in relation to velocity of liquid flow and the possibilities of the RANGE of control of such velocities by use of the slice overflow combination for the regulation of flow to the DESIRED velocity. Study of in balance data and out of balance data (Tables 4 and 5) will provide an opportunity to work out any combination of liquid levels to either counteract or accelerate the velocity of liquid flow from any liquid head differential height in the operation of any diameter of cylinder mold. The reader must bear in mind that the effective velocity force of the differential in liquid levels between the level in the mixing box and the level in the supply pool, in this instance 12 inches, is USED UP in the approach system and the liquid flow arrives at the supply pool at nearly zero velocity. This 12 inches of liquid level differential may be used for liquid level identification purposes as the unit of equilibrium, or, abbreviated to UOE.

Under liquid level balanced condition the flow of water to the formation area, the circle, is ENTIRELY under the control of the rate at which the water flows through the wire mesh in performing the ACT of formation. Such flow is controlled on the machine by adjustment of the SUCTION head, the liquid level differential between the INSIDE and the OUTSIDE of the mold. This water drainage of formation, primarily controlled by the stock preparation and adjusted to operating conditions by the regulation of the suction head through the medium of the spillway overflow is the No. 3 of the three major velocities. Numbers 1 and 2 velocities, as we have noted, *can be* controlled by provision of mechanical adjustment on the machine.

TABLE 4—Liquid levels in balance

Mixing Box (inches)	Supply Pool UOE (inches)	Formation		Back Circle UOE (inches)	Remaining Velocity Head
		Commence	End		
24	12	45.d	45.d	12	0
22	12	40.d	40.d	12	0
20	12	35.d	35.d	12	0
18	12	30.d	30.d	12	0

TABLE 5—Liquid levels off balance acceleration of velocity

Mixing Box (inches)	Supply Pool UOE (inches)	Formation		Back Circle UOE (inches)	Effec. V. Head (inches)	Vel. fps
		Commence	End			
24	12	45.d	45.d(D)	12	0	0
24	12	45.d	40.d(C)	12	2	3.27
24	12	45.d	35.d(B)	12	4	4.63
24	12	45.d	30.d(A)	12	6	5.67

Any combination of differential of liquid levels may be arranged by changing the NUMBER OF DEGREES of the mold circumference in use as FORMATION LENGTH PER REVOLUTION of the cylinder mold. Reference to the Velocity Table will give the velocity flow speed of any of the liquid differentials it is desired to use within the operating range. The overflow type vat has now been in commercial operation for nearly 20 years in one form or another. The original drawing of the vat shown in Figure 4 was made in 1935 and in PRINCIPLES of operation demonstrates all that an overflow vat is designed to do. In recent years the more modern type has further refinements of approach flow design and more streamlining of flow and greater cleanliness by the use of stainless steel. The important fact to bear in mind is that although regulation of velocity flow *through* the formation circle, and right back to the liquid level in the mixing box, is an accomplished fact of operation the maximum operating speed of the cylinder mold machine—EITHER OVERFLOW OR COUNTERFLOW type—is *still* in the range of 600-650 fpm as compared with the range of 1200-1600 fpm for the fourdrinier type machine. The reader should also bear in mind that the PRIMARY control of TIME RATE OF WATER DRAINAGE, the factor in papermaking which most vitally affects all VOLUMES or VELOCITIES of flow of such volumes used in forming a sheet of paper, is in the control of the BEATING of the stock selected.

There are many proponents for both the counterflow and the overflow type of vat, so much so that machinery builders have designed vats which may be used either as counterflow or overflow. Both have proven their value *but* cylinder machine operation, as far as FORMATION at high speeds is concerned, has still to utilize to advantage the forces of gravity and centrifugal force which in present operations apply adversely to effective formation of paper at high speeds.

PAPER SKETCHES

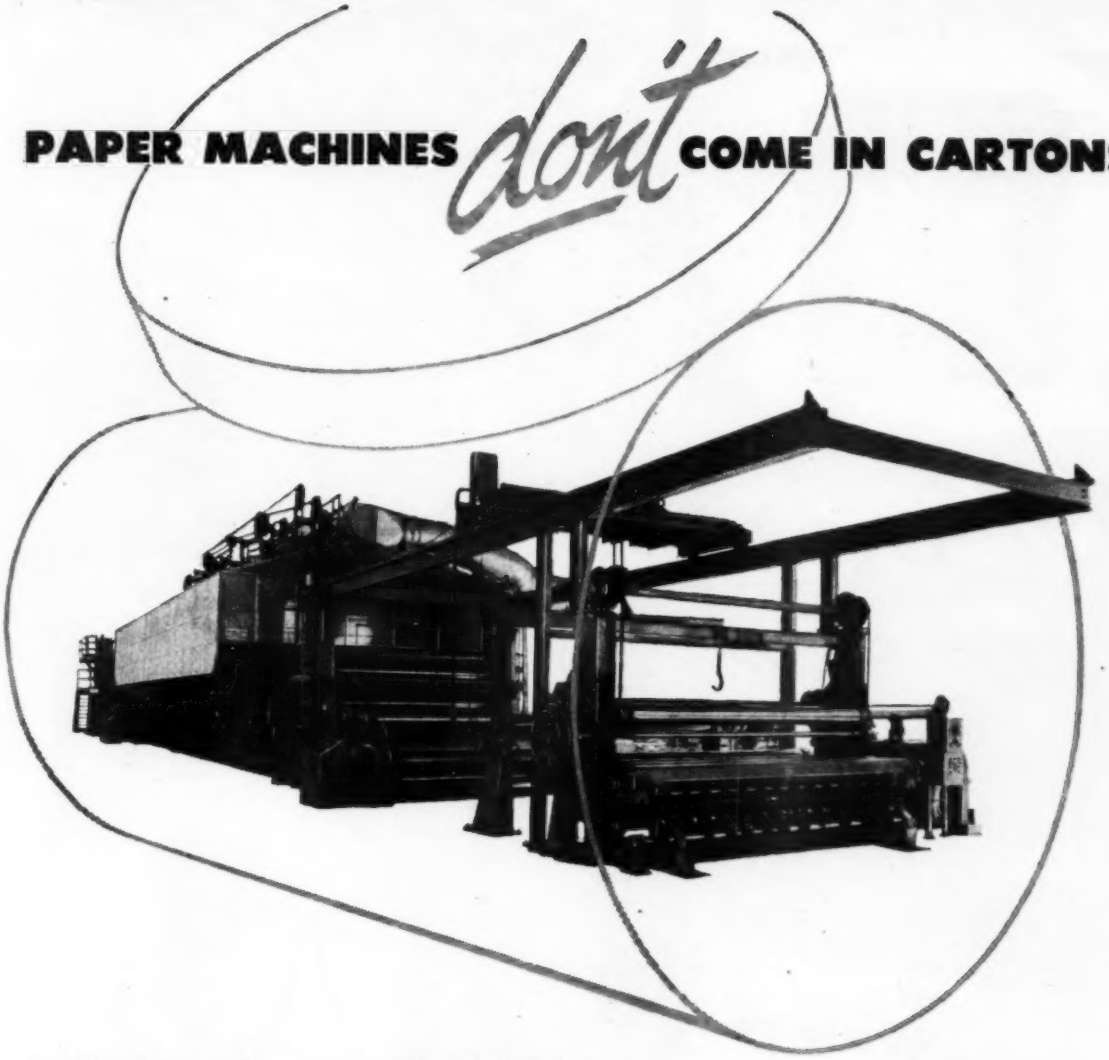
In the paper mill he built at Nuremburg, Germany, about 1390, Ulman Stromer originally used two rollers to keep 18 stampers operating. When he decided to add a third roller, his workmen were furious. Indeed, they denounced Stromer's decision, and solemnly announced that they would not consent to the innovation.

In 1776 during the American Revolution, the Pennsylvania Council of Safety forbade papermakers to join the volunteers getting ready to march to New Jersey.

AS EARLY as 1820, the paper mill founded by Solomon Curtis on the banks of the Charles River in Massachusetts was producing a paper containing mohair thread for use of a bank in the vicinity.

LUMINESCENT packaging tape that literally "glows in the dark" has recently been developed for use in sealing and marking boxes that must be readily identified in unlit areas.

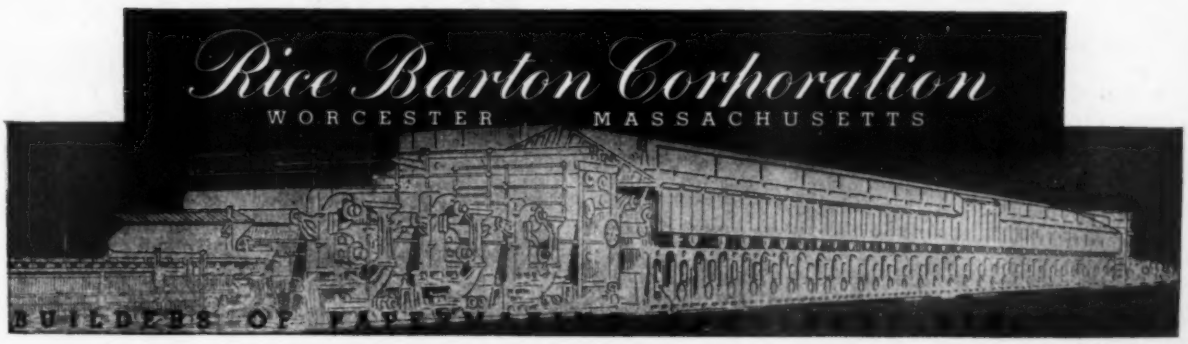
PAPER MACHINES *don't* COME IN CARTONS...

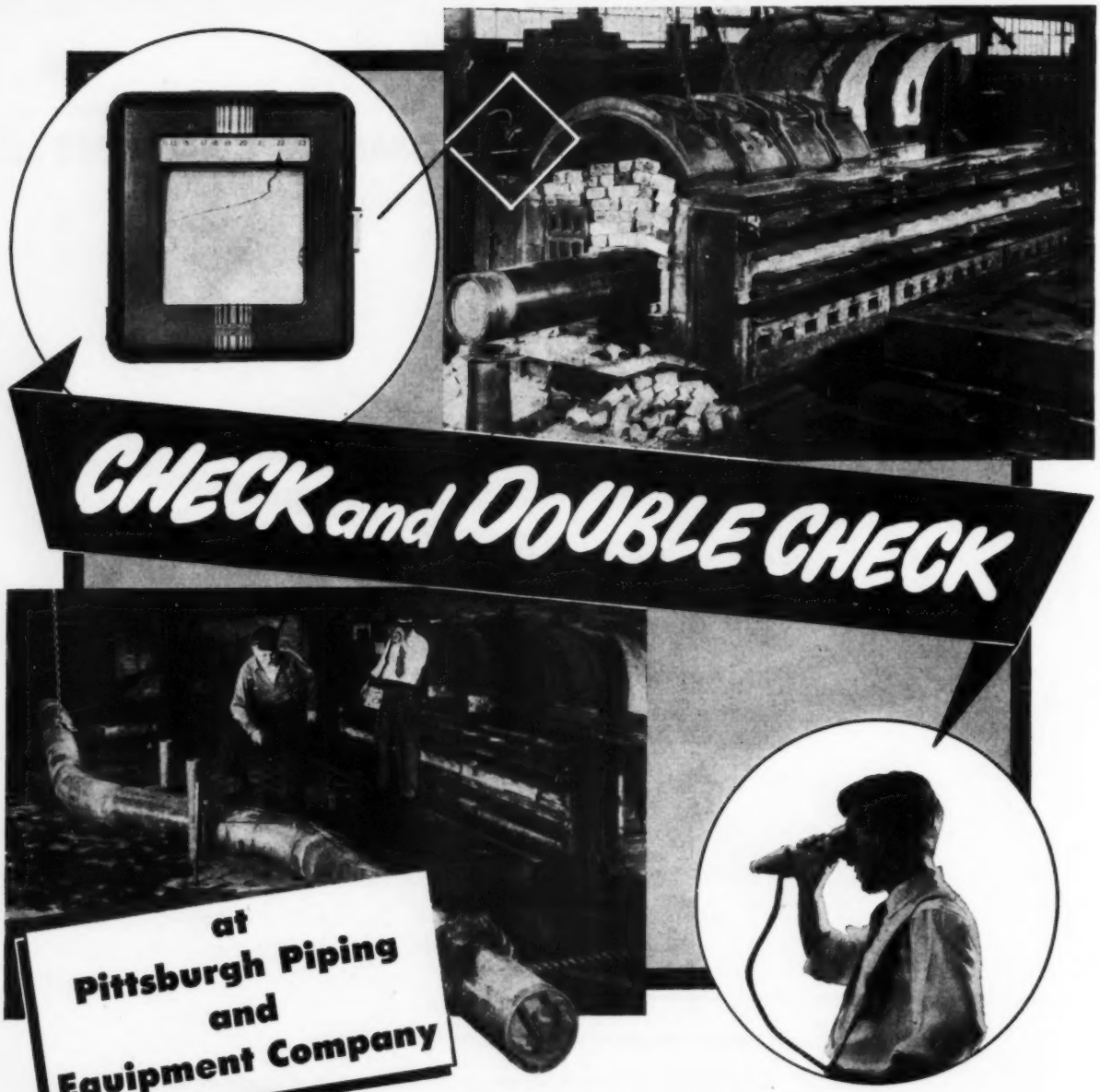


Each Rice Barton machine is engineered and built to do a specific job and to fit the requirements of space, location and production.

That's why Rice Barton machines have won so many friends in mills where costs, quantity and quality count.

Whether you make heavy board for cartons or the fussiest, thinnest paper for radio condensers, we would like to work out your problems with you. Please write:





on HEAT TREATING and BENDING TEMPERATURES

The temperature to which P.P.&E. piping is subjected before bending is measured by a Ray-o-Tube which projects through the furnace wall . . . and recorded on the chart of the Micromax instrument.

This time-temperature record makes practicable precise control of conditions so that each section of pipe is heated in conformance with a predetermined routine which assures consistent physical and mechanical properties.

After the pipe is taken from the furnace, it is immediately placed on a bending table, and during the bending process its temperature is periodically checked with an optical pyrometer by a trained, experienced observer.

You can depend on Pittsburgh Piping and Equipment Company for leadership in methods that assure greatest safety, highest efficiency, and longest service from high temperature, high pressure piping.

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AND EQUIPMENT COMPANY
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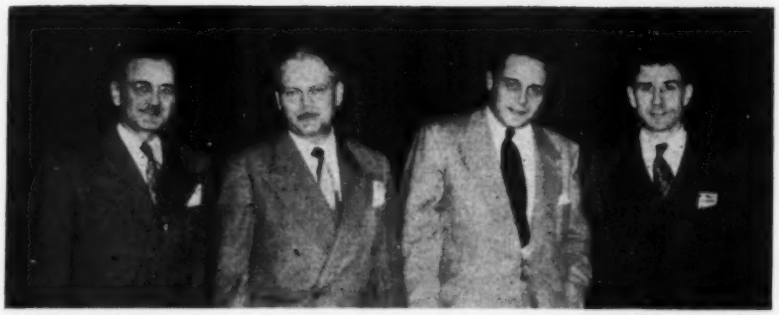
Public Square Building, Cleveland
110 High Street, Boston
Heights State Bank Bldg., Houston

The Paper Industry Association News



EXPERTS who discussed box industry trends at meeting of Chicago TAPPI. Left to right—Harry Wahn (Ace Carton Co.), Edward C. Berg (Ace Carton Co., who acted as moderator), John Redpath (Chicago Carton Co.), and Joe Kubicka (Container Corp. of America)

Box Industry Trends Presented At March Meeting of Chicago TAPPI

▶▶▶ Current trends and past history of the paper box industry formed the subject discussed by a panel at the dinner meeting of the Chicago Section of TAPPI, held March 19. Members of the panel were:

Joe Kubicka,
Container Corp. of America.
Harry Wahn, Ace Carton Co.
John Redpath, Chicago Carton Co.

The speakers were introduced by Edward C. Berg, of Ace Carton Co., who acted as moderator.

A short session of questions and answers was begun with the question: *"Is there a formula used by the trade whereby the amount of drag on a drag lock infold carton can be determined by the degree of angle of the diagonal crease? Where should the diagonal score begin in relation to the corner of the carton where the score rules meet?"*

A. The diagonal score should form angles of 44 deg. and 46 deg. with the slot and side score respectively. To get drag on lock corner, the drag lock should line up with the center of the end score. (A sample carton was presented to illustrate.) The three scores should meet in the center—the diagonal score should meet where the end side scores come together.

Q. *In your opinion, what is the ideal moisture content of chip to be used in single and double sheet lined boxboard; and the moisture content of the finished lined sheets? To what extent does moisture content of chip influence curl and warpage of finished lined sheets?*

A. Very difficult to answer; desirable moisture content depends on many factors. Moisture content has a very important influence on curl of lined board. Board is not dimensionally stable, and if its equilibrium content at certain air conditions is x% and the board has a higher content, it will lose moisture and curl, particularly in the cross direction.

Q. *In laboratory control of folding box boards, are any tests conducted to determine the adhesive receptivity of the board before it is delivered to a carton manufacturer?*

A. Assuming the question relates to water soluble adhesives such as dextrines, the test generally used is one indicating the resistance of the board surface to water penetration, for example the Abrams No. or the water drop test. The tests are not too good, but it is known that if the test value is above a certain level, trouble with the adhesive taking to the board results.

Q. *Considering the facts that off-set printing affords higher speed printing, cleaner, finer printing and lower plate costs, why isn't this type of printing more widely used in printing cartons?*

A. Each printing process has its place in the folding box industry. The off-set can screen better on rough board than letterpress. Off-set is the coming process, but it is more touchy and this fact is probably the main reason it is not used more at present.

The papers presented by the panel speakers appear in this issue.

Coming Events

April 13—Annual meeting of Pacific Coast Section of TAPPI; featuring annual Shibley Award contest.

April 17-20—20th National Packaging Exposition of the American Management Association, in Atlantic City, N.J.

April 19—The Miami Valley Division of the Superintendents Association will hold its regular monthly meeting at the Manchester Hotel, Middletown, Ohio.

April 30-May 4—Materials Handling Conference, sponsored by American Material Handling Society, will be held in Chicago in conjunction with the Society's Materials Handling Exposition.

May 1—Metropolitan Section of TAPPI will meet; subject will be announced at a later date.

May 4-5—Spring meeting of the Northwestern Division of the Superintendents Association, to be held at the Radisson Hotel, Minneapolis, Minn.

May 4-5—Southeastern Division of the Superintendents Association will hold its Spring Meeting at The Jefferson Hotel, Richmond, Va.

May 7-11—Greater New York Industrial Show, sponsored by New York Technical Societies Council, at the Armory, New York.

May 11-12—Spring Meeting of the Pennsylvania-New Jersey-Delaware Division of the Superintendents Association, to be held at the Hotel Easton, Easton, Pa.

May 12—The 1951 Ladies Night Dinner Dance meeting of the Michigan Division of the Superintendents Association will be held at the Hotel Harris, Kalamazoo, Mich.

May 25—The Spring Meeting of the Miami Valley Division of the Superintendents Association will be held at the Piqua, Ohio, plant of Orr Felt and Blanket Co.

June 3-6—Set-Up Paper Box Competition will be a feature of the 33rd annual meeting of the National Paper Box Manufacturers Association, to be held in Atlantic City.

June 7-9—Summer meeting of the Technical Section of CPPA, to be held at Bigwin Inn, Lake of Bays, Ont., Canada.

June 24-29—Annual meeting of the Superintendents Association to be held at Multnomah Hotel, Portland, Ore.

Sept. 14-15—Fall meeting of the Northwestern Division of the Superintendents Association to be held at the Northern Holiday Resort, Marenisco, Mich.

Oct. 1-4—Sixth Annual Industrial Packaging and Materials Handling Exposition, sponsored by the Society of Industrial Packaging and Materials Handling Engineers, will be held at the Cleveland Public Auditorium, Cleveland, Ohio.

Oct. 8-12—39th annual congress of the National Safety Council, Chicago, Ill. Head-

quarters will be in the Stevens Hotel; other schedules and program details to be announced later.

Oct. 10-12—A joint meeting of the Southern and Southeastern Divisions of the Superintendents Association will be held at the George Washington Hotel, Jacksonville, Fla.

Michigan Supts. Hear Stock Preparation Experts

A dinner meeting held March 15 at Hotel Harris, Kalamazoo, Mich., by the Michigan Division of the Superintendents Association featured up to the minute information on stock preparation equipment development. Experts representing nine manufacturers of such equipment addressed the group.

These experts, and the firms they represented, included: *Rover J. Shouvlin,* The Bauer Brothers Co., Springfield, Ohio; *Arthur W. Griffith,* Douglas Robbins & Co., Middletown, Ohio (representing Hermann Manufacturing Co., Lancaster, Ohio); *Richard Ahrens,* Improved Paper Machinery Corp., Nashua, N.H.; *Charles H. Vickery,* E. D. Jones & Co., Pittsfield, Mass.; *R. Burke Morden,* Morden Machines Co., Portland, Ore.; *H. A. Ronningen,* The Noble & Wood Machine Co., Middletown, Ohio; *R. Bennett,* Valley Iron Works Co., Appleton, Wis.; and *Richard W. Polleys,* Downingtown Manufacturing Co., Downingtown, Pa.

After these machinery representatives had spoken, Merle Wilkins, Kalamazoo Paper Co., Kalamazoo, Mich., served as moderator for a question and answer session. Mr. Wilkins was assisted by a panel which included Alfred B. Perlick, beater room superintendent, Kalamazoo Vegetable Parchment Co.; Harrison Kindig, assistant superintendent, Mac Sim Bar Paper Co.; Wendell R. Tobin, technical superintendent, American Box Board Co.; Herbert B. Johnston, plant engineer, Allied Paper Mills; Melvin J. Killian, technical superintendent, Bryant Division, St. Regis Paper Co.; and Louis J. Schoid, general superintendent, Watervliet Paper Co. Firms represented by panel members are located in the Kalamazoo, Mich., area.

O. W. Callighan, Edgar Brothers Co., chairman of the Division, presided at the meeting.

A LIST OF MEMBERS for 1951 has been released in pamphlet form by the American Council of Commercial Laboratories, Inc., 4302 East-West Highway, Washington, 14, D.C. This list will be sent to anyone addressing request to H. M. Dudley, executive secretary of the Council.

NATIONAL PRESIDENT Geohegan (left) attended the March meeting of Ohio Section of TAPPI. E.T.A. Coughlin (center), a national past president now engaged in government service, was guest speaker; he was introduced by Ohio Section Chairman Don Goodman (right)

Ohio TAPPI Section Hears E.T.A. Coughlin . . . Nat'l Pres. Geohegan Attends

One hundred and fifteen members and guests of the Ohio Section of TAPPI were present for the March 8 meeting of the Section, held at the Manchester Hotel in Middletown, Ohio. The Section's chairman, Donald Goodman, introduced Ken. Geohegan, newly-elected TAPPI national president, and a member of the Ohio Section. Mr. Geohegan spoke briefly concerning plans for a TAPPI research program which would fill gaps in the present knowledge of pulp and paper manufacture; administered through the various committees at present functioning for the National Association, the program will need the active support of all members.

After Mr. Geohegan's remarks, Mr. Goodman introduced E. T. A. Coughlin, chief of the Paper and Pulp Products Unit of the Chemical and Plastic Section —Research and Development Branch— Military Planning Division of the Office of the Army Quartermaster General.

Discussing some of the wartime uses of paper in relationship to paper properties, Mr. Coughlin commented that utilization of present commercial grades of paper is made wherever possible; nearly every Ohio mill can produce one or more of these items.

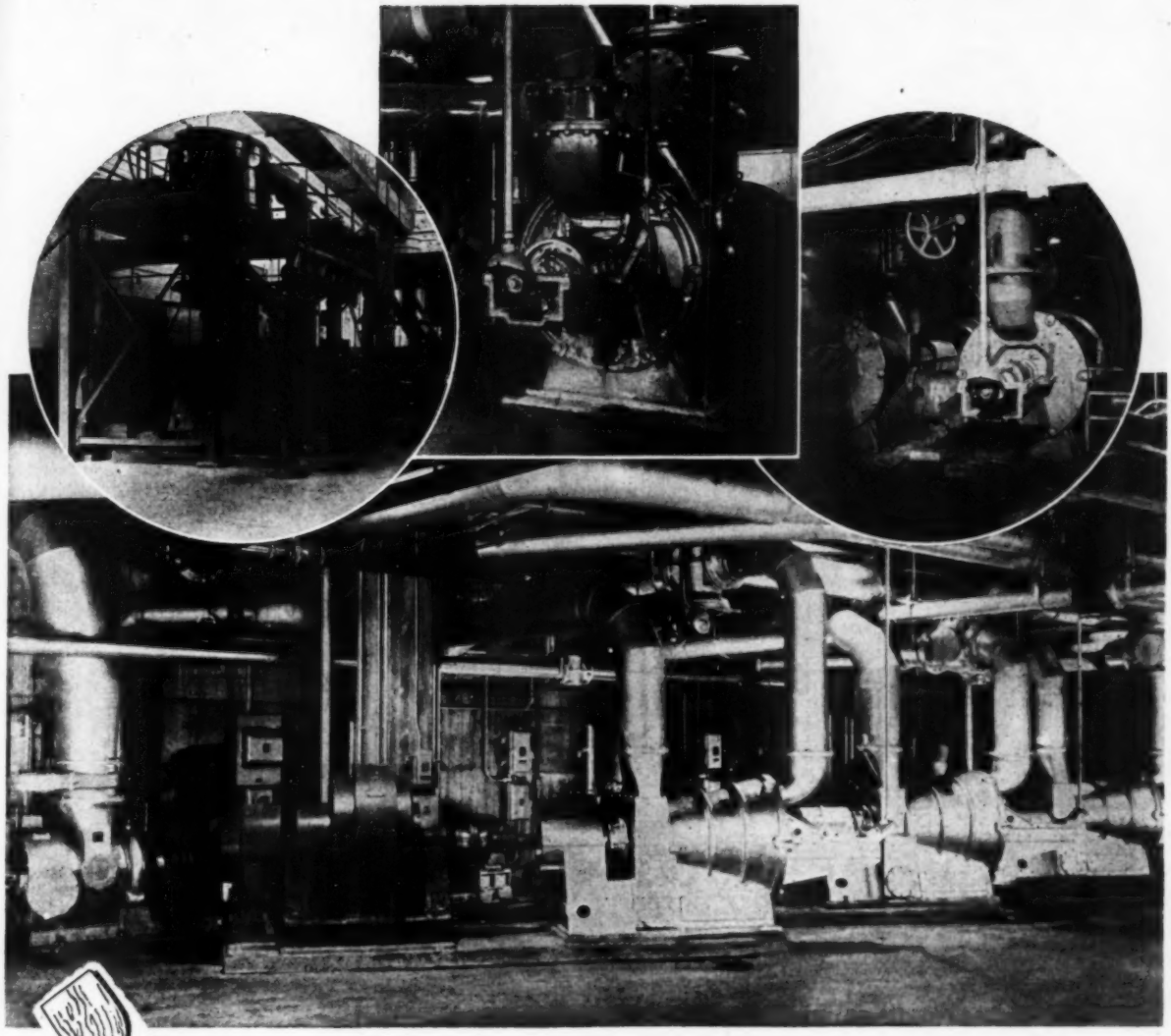
Stressing the Government's need for a complete index of the types of papers and tonnage which can be produced in each mill, Mr. Coughlin suggested that a condensed statement—confined to a 3 x 5 card—of the particular grades made, daily tonnage, maximum and minimum trim, weights, furnishes, etc., would be of service to procurement men seeking to supply special papers. A similar listing of individual papers, which would form a cross-index with the mill card, would make the Procurement's records even more efficient.

Illustrating his talk with samples of papers developed for specific special uses, Mr. Coughlin commented that the majority of the paper needed by the Quartermaster Corp. is used in packaging; application of compounds which will make paper mildew resistant, and insect and rodent repellent is being investigated by the Quartermaster Corp.

NEW SECRETARY OF the New York-Canadian Division of the American Pulp and Paper Mill Superintendents Association, Lester D. Carner, Lockport Felt Co., Newfane, N.Y., was appointed to the position when reasons of health forced Whitney Loddengaard, United Board & Carton Corp., Syracuse, N.Y., to relinquish the position.

TREMENDOUS GROWTH of the South's forests was predicted by E. W. Tinker, executive secretary of the American Paper and Pulp Association, when he addressed a recent meeting of the Southern Pulpwood Conservation Association. He pointed out the economic importance of tree farming, placing the 1950 production of pulpwood in the South at 10,200,000 cordes, or 46.8 per cent of the national total.

OFFICERS ELECTED by Southeastern Paper Trade Association recently included the following men: J. Warren White, Jr., Norfolk, Va., president; A. N. Henley, High Point, Va., first vice president; C. N. Payne, Richmond, Va., second vice president; Mark Eiseman, Richmond, Va., secretary; and William Rose, Richmond, Va., treasurer. Thomas J. Craig, executive vice president of Dillard Paper Co., Roanoke, Va., was elected to the board of governors.



Why punish Freddie Fiber!

That is exactly what many a mill is doing—jordaning the stock far too much—shortening the fibers—lowering the freeness—impairing the formation on the machine.

How much better to replace some of your jordans with HYDRAFINERS and do a BALANCED refining job—hydrate, fray and fibrillate the fiber in HYDRAFINERS and avoid cutting it to pieces—use jordans just enough to give you control on the machine!

A list of mills as long as your arm now use HYDRAFINERS, balance-refine their stock, and swear by this better procedure—a matter we would like very much to discuss with you.

Contact Shartle or Dilts

SHARTLE BROTHERS MACHINE COMPANY, MIDDLETOWN, OHIO

DILTS MACHINE WORKS, Fulton, New York
Divisions of THE BLACK-CLAWSON CO., Hamilton, Ohio
Western Sales Office: Mayer Bldg., Portland, Oregon
Southern Sales Office: 937 Coventry Road, Decatur, Georgia

Associate: ALEXANDER FLECK LTD., Ottawa, Canada
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Call your felt man into the huddle...

YOU, Mr. Superintendent, are probably so busy meeting the production demands of your Sales Department that you've had little time to put your planned mill improvements into effect.

Machines are running faster these days. New fillers . . . clays, ash, pigments . . . are used. New surface finish materials are called for. Each one can be a new problem in removing water fast enough to keep a sheet running at top speed with a minimum of broke.

A short talk with your Hamilton Felt Man might lead to considerable improvement simply with a change of felts.

Make your Hamilton Felt Man responsible for selecting the "right" felt. Then check your production records for improvement.

Hamilton Felts

MIAMI WOOLEN MILLS

Established 1858

SHULER & BENNINGHOFEN, HAMILTON, OHIO

The Paper Industry Names in the News

McCabe Resigns as FRB Chairman to Return to Scott Presidency

An official announcement by President Truman on March 16 was of special interest to the paper industry. In that announcement, the President made known the resignation of Thomas B. McCabe as chairman of the Federal Reserve Board. At the same time it was stated that William McChesney Martin, Jr., would succeed Mr. McCabe.

Early in 1948, Mr. McCabe left the presidency of Scott Paper Co., Chester, Pa., to become chairman of the FRB. The reason for his resignation from the government position was his desire to return to the presidency of Scott company.

Mr. Martin, the new chairman of the FRB, has been assistant secretary of the Treasury in charge of international finance since February, 1949.

Rufus Sisson, Jr., Made Pres. of Racquette River Paper Co.—Others Elected

A former vice president of Racquette River Paper Co., Potsdam, N.Y., Rufus L. Sisson, Jr., has been elected president of the firm.

Mr. Sisson succeeds George Wing Sisson, Jr., who has been president of the firm since his father's death in 1913, in the post; the recent president has been elected to the newly-created position of chairman of the board.

Other officers elected at the same meeting include Donald E. McCall and Lewis H. Sisson, vice presidents, Walter C. Sisson, treasurer; George W. Sisson, III, secretary; and Francis T. E. Sisson, Jr., assistant secretary. Directors chosen at the same meeting are Francis T. E. Sisson, Sr., Edwin R. Safford, Jr., Frederick R. Sisson, Jr., and Donald P. White.

Ben Avery Is Now President of KVP Co., Ltd.

Following the announcement of the election of A. Southon to succeed the late R. A. Hayward as president of Kalamazoo Vegetable Parchment Co., comes another announcement of general interest.

Ben Avery, who has been vice president and general manager of KVP Co., Limited, Espanola, Ontario, has been elected to succeed the late Mr. Hayward as president of that company, which is a subsidiary of the Kalamazoo Vegetable Parchment Co. E. N. Hunter, who has been secretary and manager of manufacturing at Espanola, succeeds Mr. Avery.

A. A. Melynchuk

N. C. Martin

A. A. Melnychuk Is Project Engineer with Omega Machine Co.

The appointment of Andrew A. Melnychuk as a project engineer in the home office of Omega Machine Co., Providence, R.I., has been announced. In his new work Mr. Melnychuk will be concerned with development and research in the problems of chemical feeding in the pulp and paper and allied industries.

Prior to this appointment Mr. Melnychuk was a project engineer for the National Biscuit Co., earlier, he was a development engineer with the Plastics Division of the Celanese Corp.

J. J. McDonald and N. L. Nourse Chosen for Brown Co. Appts.

Two executive appointments have been announced by Brown Co., New York.

John J. McDonald, associated with the firm since 1927, has been named pulp sales manager of the firm. Joining the firm as a member of the Research Department, Mr. McDonald served as a member of Brown's technical service department of the Pulp Sales Division from 1930 to 1932. In 1932 he became pulp sales representative in the New York regional territory, a position he held until he entered the U.S. Army in 1942. Upon his return to Brown employ in 1945, Mr. McDonald was named assistant manager of the Pulp Sales Division, a title he retained until named to his current position.

The newly created position of general sales manager of the firm has been filled with the appointment of Newton L. Nourse, associated with Brown since 1920 and head of the technical service department of the Pulp Sales Division from 1925 to 1933. He had been manager of the Pulp Sales Division from 1933 until his most recent promotion.

N. C. Martin Engaged by American Cyanamid as a Technical Consultant

A specialist in the handling of resin, N. C. Martin has been assigned to act as a consultant to firms requiring technical assistance in production of weather-proof bag seams and weather-proof solid and corrugated fiber board by the Plastics and Resins Division of American Cyanamid Co., New York.

Cyanamid has done considerable research since World War II on its Urac 180, a liquid urea-formaldehyde resin, and Urac 110, a powdered neat urea resin, used in the construction of V Board; Mr. Martin will be able to give information on the best use of these materials as well as Cyanamid's new ketonealdehyde resin.

John Wesley Hanes Has Become President and Board Chairman of Ecusta

Succeeding the late Harry H. Straus (cf. P. I., March, 1951) as president and chairman of the board of Ecusta Paper Corp., Pisgah Forest, N.C., is John Wesley Hanes, vice president and director of Olin Industries, Inc., of East Alton, Ill. Mr. Hanes also is former undersecretary of the Treasury.

Olin Industries is currently building a cellophane plant in connection with Ecusta, and will produce cellophane there under license from Du Pont company.

Chas Sumner Barton Succeeds Father as Pres. of Rice Barton Corp.

At a meeting of the board of directors of Rice Barton Corp., Worchester, Mass., Charles Sumner Barton was chosen president of the firm, succeeding his father,

George Sumner Barton, in the position; the elder Mr. Barton, who was the third of his family to serve as Rice Barton president, was chosen chairman of the board of directors.

Other officers chosen at the same meeting included Lester M. Start and Everett W. Clem, vice presidents; Stuart B. Dickerman, treasurer; and Stephen B. Stafford, secretary.

W. E. Greene Corp. Elects New Officers

New officers announced by W. E. Greene Corp., New York City, show the advancement of W. E. Greene to the office of board chairman.

Other officers elected are: F. P. Thornton, Jr., president and treasurer; E. S. Greene, vice president; C. M. Schermerhorn, vice president; and R. P. Arnold, secretary.

W. E. Greene Corp. acts as representative of Stowe-Woodward, Inc., and Lodding Engineering Corp.

Keyes Fibre Co. Elects New Officers

Former president of Keyes Fibre Co. (Waterville, Maine) Dwight S. Brigham has been made board chairman. Elected to succeed him in the presidency is Wallace E. Parsons, formerly vice president and general manager.

Ralph H. Cutting has been appointed vice president, and general manager, and John W. Thomas is now treasurer.

Woodruff Made Mgr. of Fairbanks-Morse Pump Div.

The promotion of T. E. Woodruff from assistant manager to manager of its Pump Division has been announced by Fairbanks, Morse & Co., Chicago. Making his headquarters in Chicago, Mr. Woodruff succeeds *D. T. Johnstone* —now assuming the Pump Department managership in the firm's San Francisco offices—in the position.

Associated with Fairbanks-Morse since 1912, Mr. Woodruff was manager of the St. Louis Pump Department, and for the past year and a half has been assistant manager of the Pump Division.

E. P. Gleason, former power manager of Nekoosa-Edwards Paper Co., Port Edwards, Wis., has been named manager of outside power by the company. Concurrently, *F. H. Coldwell,* formerly assistant power manager, has been named mill power manager. The appointments result from the establishment of separate departments of outside power and mill power made essential by the continued growth of company facilities and activities.

Robt. J. Stoddard

John E. Carroll

American Hoist Elects Two Vice Presidents

At a recent meeting of the board of directors of American Hoist and Derrick Co., St. Paul, two officials were elected to the vice presidency.

Robert J. Stoddard became vice president of engineering. He has been chief engineer of the company since 1947. Previous to that he was assistant chief engineer, during which term of service he was loaned to the Federal Government to make a survey of conquered European nations. Mr. Stoddard has been a board member since 1950.

John E. Carroll, general sales manager, was made vice president of sales, and was elected to the board.

C. R. Rigby, a former group executive at the Milwaukee headquarters of A. O. Smith Corp., has been named group executive in charge of the firm's Houston, Texas, plant. Concurrently, *F. B. Dunn,* former manager of the Houston works, was placed in charge of personnel for both the Houston works and the firm's entire southwest district administrative area, and *F. S. Cornell,* manager of the company's Kankakee, Ill., plant, was appointed group executive of the Kankakee works, the Eastern Motor Division at Tipp City, Ohio, and the Heating Division at Toledo, Ohio.

Earle Murray, president of the board of Northern Paper Mills, Green Bay, Wis., at the time of his retirement in 1947, passed away recently at the age of 76. Mr. Murray had been a member of the Northern board for 30 years, and served as a company vice president from 1921 until 1937, as president from 1937 until 1942, and board president from that date until his retirement. The widow and four children survive.

Richard D. Williams has been appointed assistant supervisor of industrial relations at the Gardner Board and Carton Co., Middletown, Ohio. He has been associated with the firm for the past year.

Patrick A. Forni has resigned his position as sales engineer of Smith Paper Division of Peter J. Schweitzer Inc., Lee, Mass., so that he may accept the position of acting technical director of Mead Corp., Kingsport, Tenn. Mr. Ford had been with Smith Paper since 1944; his previous connections were with General Electric at Pittsfield, Mass., and Kimberly Clark Corp., Neenah, Wis.

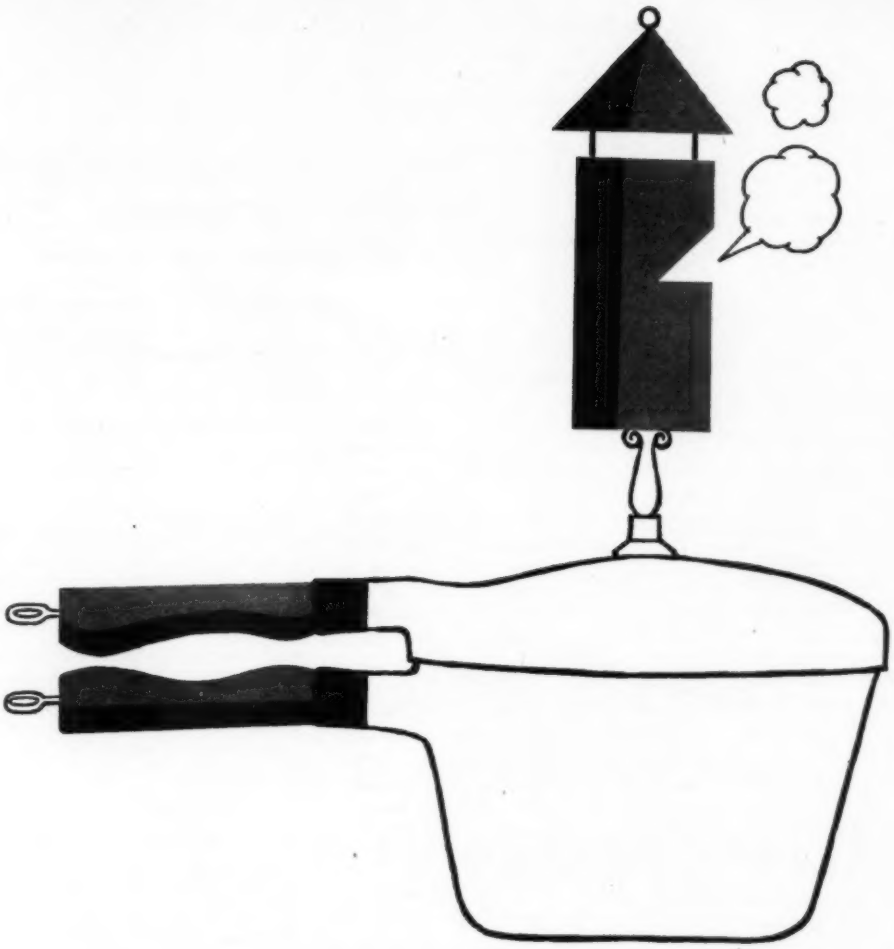
Richard Moyer, former general superintendent of the Pershing Road plant of Link-Belt Co., Chicago, has been appointed general manager of the company's North Central Division. He will make Minneapolis his headquarters. Mr. Moyer succeeds *Leslie J. Carson,* who has accepted a position with the O.P.S. in Washington. Mr. Moyer's former title and work in the Pershing plant is being assumed by *Fred B. Skeates,* heretofore personnel manager at the Pershing Road plant.

Hugh W. Sloan, vice president of St. Regis Sales Corp., New York, and formerly Pacific Coast manager of the firm's Multiwall Bag Division, has been transferred to the New York office where he will assist *Arch Carswell,* general sales manager and vice president, in the direction of bag sales. *Robin G. Swain,* formerly manager of St. Regis West Coast bag plants, succeeds Mr. Sloan as Pacific Coast manager.

E. P. Roudebush, former assistant to the vice president in charge of manufacturing for Roots-Connersville Blower Corp., Connersville, Ind., has been made works manager in charge of all production activities of the firm. Concurrently, Roots-Connersville, one of the Dresser Industries, made former Chicago District Office Manager *D. A. Johann* sales manager of the firm; *A. E. Caudle,* former chief application engineer, was promoted to assistant sales manager.

Don L. Taranto has been appointed to the sales staff of Bulkley, Dunton & Co.'s, Fine Paper Department. Formerly associated with Rochester Paper Co., Mr. Taranto also has had wide experience in the graphic arts.

Raphael Block, a member of the board sales department of Gardner Board and Carton Co., Middletown, Ohio, for the past year, has been appointed coordinator of planning and scheduling for all operations; the former public relations director of the Folding Paper Box Association, Mr. Block went to Gardner



Wyandotte Caustic cooks stronger strawboard

This story is about a strawboard manufacturer who wasn't satisfied. The company had been cooking their straw with a 10 to 12% concentration of lime. But was there a better way? They wanted to know . . . and so they got in touch with Wyandotte's Technical Service.

We made suggestions and they started to run some tests. The second test was a success. A combination of 4% caustic soda and 2% lime created a strawboard that was *one-third stronger*.

But that was just the beginning. Wyandotte's Technical Service recommended liquid caustic, drew up plans for handling, storage and dilution, and was on hand when the first tank car was unloaded. That's Wyandotte's Technical Service for you — and it *is* for *you*.

SODA ASH • CAUSTIC SODA • BICARBONATE OF SODA
CALCIUM CARBONATE • CALCIUM CHLORIDE • CHLORINE
HYDROGEN • DRY ICE • SYNTHETIC DETERGENTS • GLYCOLS
CARBOSE (Sodium CMC) • ETHYLENE DICHLORIDE • PROPYLENE
DICHLORIDE • AROMATIC SULFONIC ACID DERIVATIVES
OTHER ORGANIC AND INORGANIC CHEMICALS

WYANDOTTE CHEMICALS CORPORATION
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after completing a special assignment for William W. Fitzhugh Co., New York. Concurrently, *Charles K. Pigman,* associated with Gardner since 1912 and superintendent of the Middletown carton plant for the past 18 years, was named sales service engineer.

John R. Fennie has been appointed manager of the tubular products department of Joseph T. Ryerson & Son, Inc., Los Angeles. Mr. Fennie, whose background includes 15 years supervisory and sales work with Bethlehem Steel Co. of Lackawanna, N.Y., and several years as assistant superintendent of Open Hearth for Kaiser Steel Co. in Fontana, Calif., joined Ryerson as a sales staff member in 1946.

Harvey H. Millier, Jr., formerly associated with Allis-Chalmers Manufacturing Co., Milwaukee, has been appointed mid-New York sales representative by Sealright Co., Inc., Fulton, N.Y. Another recent Sealright appointment was that of *John LeMessurier,* a Sealright representative for the past 15 years, as head of a new company district office at Syracuse, N.Y.

Chester W. Schweers has been named director of sales of Allis-Chalmers, Milwaukee, general machinery division. Mr. Schweers, connected with the firm's general machinery division sales organization for more than 20 years, will be succeeded as manager of the New England Region by *Merton M. York.* Mr. York has managed the Boston district office of the firm for the past year.

Harry G. Anderson, heretofore district sales engineer at Milwaukee for Link-Belt Co., Chicago, has been appointed district manager of the firm's Birmingham, Ala., office, succeeding *J. T. Bell, Jr.,* called back into Army service.

John D. Cowan was elected executive vice president of West Virginia Pulp and Paper Co., New York; in a board election which also made *James R. Shea, L. Frank Thompson,* and *Wiley L. Jennings* directors of the firm.

Edwin S. Ladley has been named assistant director of purchases of Hercules Powder Co., Wilmington, Del. Mr. Ladley, formerly a buyer for the company's purchasing department, succeeds *William L. Hewes.* Mr. Hewes retired from company service December 31, ending a 41 year association.

Dr. Thonet C. Dauphiné has joined Hooker Electrochemical Co., Niagara Falls, N.Y., as manager of the firm's sales development. Dr. Dauphiné has been eastern manager of product development for Oronite Chemical Co. since 1946; prior to that association he was a supervising engineer for California Research Corp. Both Oronite and California research are wholly-owned subsidiaries of Standard Oil Co. of California.

W. T. Eldredge has been named district sales manager of the newly-formed South-Central sales territory of Hammermill Paper Co. which has been established at the firm's Erie, Pa., headquarters, and consists of territory from both the Central and Southern sales territories. In the remaining Central territory, *H. R. Landers,* assisted by *H. B. Wilson,* remains as district sales manager; *R. F. McMahon* will continue as district sales manager for the Southern territory, but will move his headquarters from Erie, Pa., to Dallas, Texas.

Warren F. Noonan has been appointed chief pilot of The Gardner Board and Carton Co.'s recently acquired twin-engine Beechcraft airplane. Mr. Noonan, who will work from the firm's Middletown, Ohio, headquarters, was formerly company plane pilot for Standard Oil Co. of Ohio, Cleveland.

Earl E. Grant, president of The Crystal Tissue Co., Middletown, Ohio, was recently awarded an honorary life membership in the Middletown Junior Chamber of Commerce in recognition of his leadership in community activities.

George V. Johnson, secretary of Elof Hansson, Inc., New York, has been re-elected president of the United States Paper Importers Council. *Fred C. Strype,* secretary of F. C. Strype, Inc., was re-elected vice president; the new secretary-treasurer is *Joseph V. Carena,* executive vice president of Van Reekum Paper, Inc.

Edward H. Petrick, formerly in charge of the liner board sales of West Virginia Pulp and Paper Co., New York, has been made general sales manager of the company. Mr. Petrick succeeds *Wiley L. Jennings,* recently elected vice president in charge of sales.

Leslie Cleminson has been appointed general manager of British Columbia Pulp and Paper Co., Vancouver, B. C., Canada.

L. R. Boling was elected secretary of Oliver United Filters Inc., at a recent board meeting held at company headquarters in Oakland, Calif. Mr. Boling succeeds *E. L. Oliver, Jr.,* elected vice president of Oliver United at the same meeting; Mr. Oliver will retain his position as company treasurer and controller.

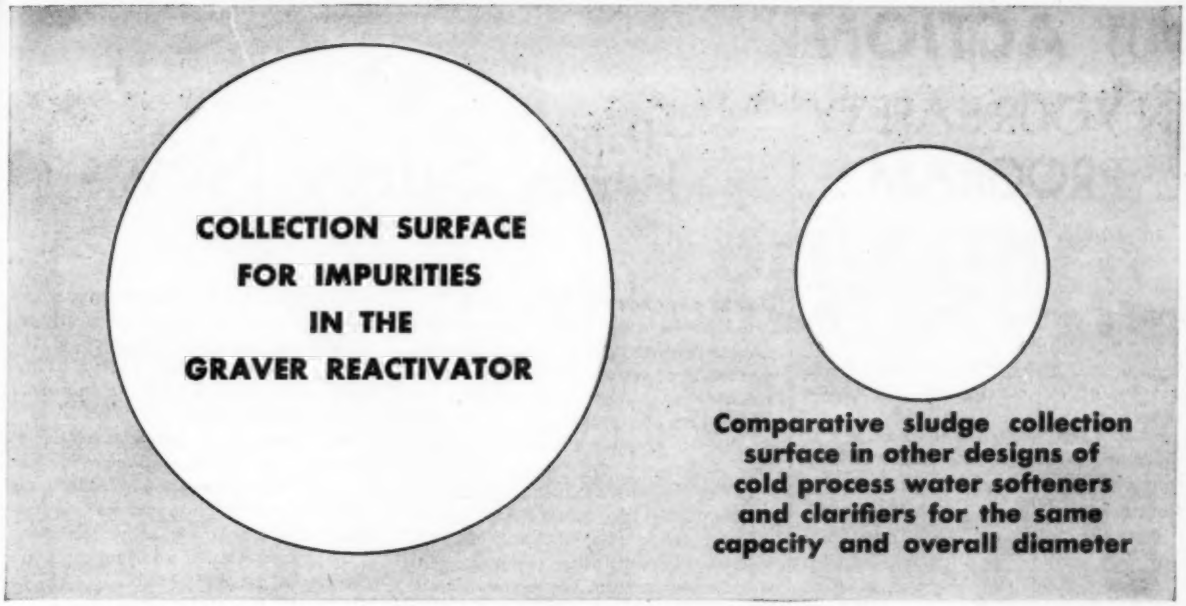
Bradley Dewey, Jr., has been elected a vice president of Dewey and Almy Chemical Co., Cambridge, Mass., in charge of the Cryovac Division. Dr. Dewey, who joined Dewey and Almy in 1945, was the organizer of the firm's product development, and has headed Cryovac operations since last August.

Eugene Hoffman, formerly treasurer of the Howard Paper Mills, Urbana, Ohio, has been elected assistant treasurer of Riegel Carolina Corp., a subsidiary of Riegel Paper Corp., New York. Mr. Hoffman will retain an official position with the Howard firm, but will be temporarily located at Riegel's New York office, where he will serve as expeditor of the new Riegel pulp mill now under construction at Acme, N.C.

Murlyn B. Dickerman has been appointed director of the Lake States Forest Experiment Station at St. Paul, Minn. Mr. Dickerman has been chief of the Division of Forest Economics of the Northern Rocky Mountain Forest Experiment Station, Missoula, Mont., since 1946. He succeeds *Elwood L. Demmon,* who was recently appointed director of the Forest Service experiment station at Asheville, N.C.

William F. Lanigan, formerly a member of the Watertown, N.Y., offices of St. Regis Paper Co., New York, has been appointed manager of the Chicago office of the company's Kraft Paper and Board Sales Division. *James Wallace,* associated with St. Regis for the past nine months, has been appointed to a like position in the Los Angeles office of the Division.

B. P. Altick was appointed a vice president of Fibreboard Products Inc., San Francisco, in a recent board election. During World War II Mr. Altick was director of the Containers Division of the WPB; until he transferred to Fibreboard in 1950 as assistant to the president, he served as vice president of Federal Container Co., Philadelphia, a wholly-owned Fibreboard subsidiary.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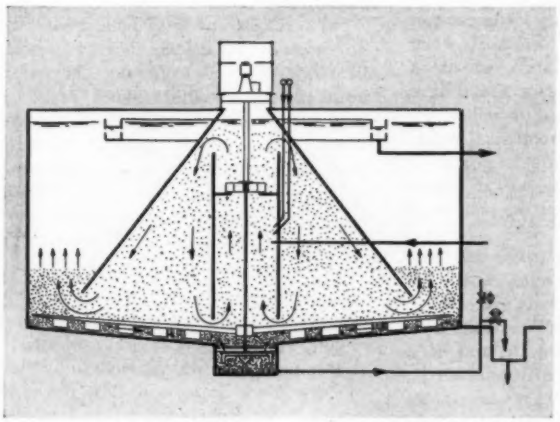

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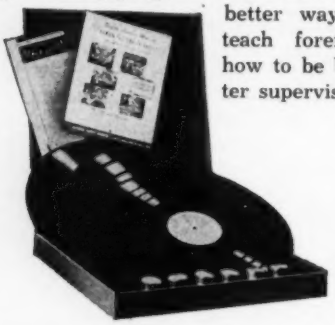

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The Paper Industry Safety News

Death punches no time clock

Industry is winning the battle against work accidents. Year after year, our nation turns in record new lows in work accident rates. But we are making no such spectacular progress in eliminating accidents to people when they are off the job.

On the job we are influenced for safety in many ways. Posters with safety messages. Foremen talk safe working procedures. Company rules require careful work practices. Safety devices and safety equipment protect the workers.

But it is a serious, and often fatal, mistake for us to relax once we've punched out our timecard and put our working clothing aside for the day. We are, it is true, out from under supervision and beyond the jurisdiction of company safety rules. But the hazard is still there. It is, in fact, increased. For every worker killed on the job there are two workers killed by accidents while off the job.

This country is mobilizing more forces to fight the off-the-job injury problem. Better highways, intelligent traffic regulations, tighter control of public buildings and public recreation—these all help. In the long run, however, progress can be made only by people like us. If, when we put up screens at home, we use a rickety ladder that our plant would have scrapped, we have no one to tell us we can't. If we behave stupidly as pedestrians, there aren't enough police to stop us. If we drive badly, we can escape a traffic ticket if there is no policeman near.

But common sense gives the best possible reason for playing safe away from work. Off-the-job accidents kill 33,500 Americans each year. So, the next time you punch out your timecard and head for home, remember: Death punches no timeclock! He works 24 hours!—From *Sutherland News*, published by Sutherland Paper Co., Kalamazoo, Mich.

Gardner Board and Carton Achieves Safety Record

At the annual banquet of the Middletown (Ohio) Safety Council, held last month, The Gardner Board and Carton Co., Middletown, was presented an Ohio State Safety Award for winning top place in the 1950 Middletown Industrial Safety Campaign. The award was presented for outstanding effort and achievement by the supervisory forces and employees of Gardner in greatly reducing the accident frequency in the jointly sponsored safety contest of the local safety council and the Industrial Commission of Ohio.

An achievement certificate was also awarded the Gardner company by the National Safety Council for reducing the frequency of disabling injuries and having a frequency rate below the group average in the Paper and Pulp Section's contest for the year 1950.

TV Antenna—a Safety Hazard

Television antennas are going up all over the country, and so are accidental deaths caused by them. A file folder at the National Safety Council is receiving more and more case histories and newspaper items telling a grim story of death on a roof top.

Amateur handymen account for nearly all the deaths, the Council said. When television sets were first sold, the price included professional installation. In recent months, sets have been offered with an antenna kit which the set owner could erect himself.

As a result, antennas have been put up without regard to nearby power lines, attached to crumbling chimneys, even placed on utility poles carrying high voltage. Most fatalities have been due to electric shock, although falls to persons unfamiliar with roof top work have added to the toll. (From the Pulp and Paper Section *Newsletter*, published by the National Safety Council.)

ACCIDENT-FREE OPERATION during the 26th annual accident prevention contest sponsored by Associated Industries of New York State won "100 per cent awards" for Robert Gair Co., Inc., Ft. Niagara Corrugated Division; the Tonawanda Mill of International Paper Co.; and Lawless Brothers Container Corp., all of the Niagara Falls, N.Y. area. Fort Wayne Corrugated Paper Co. won the same award at Rochester, N.Y.

TELEVISION has become a visual aid, according to Better Vision Institute; it brings out "seeing" difficulties that have not been noticed.

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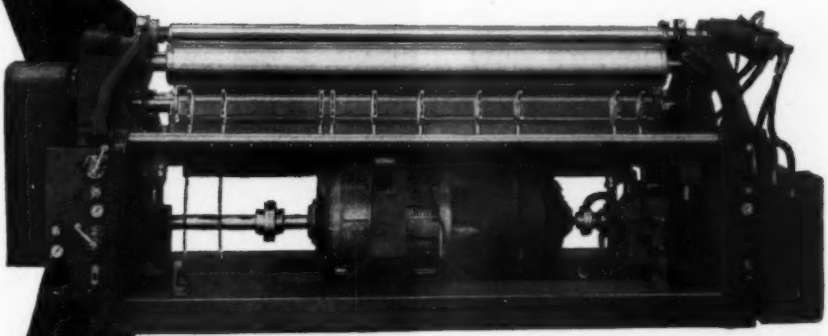

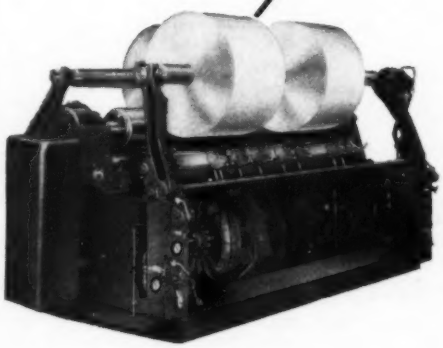

The new B & S #15 Duplex Rewinder is powered by a Louis Allis Eddy Current Type Variable-speed Drive. A variable volume pump driven by an A. C. motor supplies power to the rewind shafts, and the winder is powered by the Eddy Clutch. By placing the entire drive beneath the machine, B & S designers have saved valuable floor space.

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Foreign Abstracts . . . . . .

Fig. 1—Experimental plantation in Ekebo, Skane, Sweden. Leader of experiments, C. L. Kiellander, showing the height of 5-year-old native spruces; at right, mountain spruces of the same age from Central Germany (short-day climate)

Fig. 2—39-year-old lodgepolepine *(Pinus contorta latifolia)*, too dense stand, grass-type soil with reproduction from nearby spruces and broad-leaved trees. Private forests, Mustila, South Finland. Photographed immediately after thinning in Sept. 1950

Pulpwoods, with special reference to the silviculture of spruce and lodgepole pine

The ranking pulpwood raw material of Europe is spruce *(picea abies)* and the author (a forester) outlines silvicultural experiments leading to its hardy propagation. Spruce from the mountainous regions of Central Germany (The Harz, Thüringen, and Black Forest) when brought to Northern Europe surpassed the local spruces in rate of growth (cf. Figure 1). This result was explained by the fact that spruces reared in summers with short days, when brought into areas where the summer days were longer, produced more wood. However, these mountain spruces have a marked disadvantage: they put forth new shoots too early in the spring and then fall victims to night frosts. This leads to losses, stunting and crooked growth.

The author, 25 years ago, discovered a small reserve area growing lowland spruces of excellent quality which stood up against late frosts (because they reared late shoots). Seeds from these were collected and reproduced in his private forest but the young plantations were destroyed in World War II. However, some of the original seeds were planted in the Danish State Forest Experimental Station and these plantations (although not yet bearing seed) are still safe. Propagation of this hardy spruce species is being effected now in Sweden and Western Germany. Common spruce regenerated on loam and marl soils was susceptible to red rots, especially in the rapid, early stages of growth.

A tree which offers marked opportunity for pulpwood is the American lodgepole pine *(pinus contorta latifolia)*. Large scale silvicultural experiments with this tree were carried out in South Finland at Mustile (cf. Figure 2). On fresh, lightly loamy soil this species showed excellent growth, and after 33 years yielded 320 cubic meters per hectare. (Scots pine yielded 207 cubic meters, and spruce only 160 cubic meters per hectare). In this case seed was imported from Northwest Canada. To attain maximum productivity of lodgepole pine, the following conditions should be adhered to: (1) the local climate of the regeneration area should conform to that in which the seed was originally grown; (2) the soil should be good and fresh, even to humid broad-leafed soils of the grass-type which are neutral or slightly alkaline (with avoidance of acid podsols, dry sands, or swampy areas); (3) the tree should *not* be planted in dense pure stands but with large spacings and with an admixture of one third to one half of other tree species. It is best to use 2-3 year old trees, and to introduce hardwoods like alder *(Alnus glutinosa or A. incana)* because of their soil improving and nitrogen-fixing qualities, and because they reduce insect attack. Lodgepole pine requires no hoeing and naturally suffocates weeds. It is immune to the following: leaf cast, pine blister rust (in the "pole age") and conk rot attack. After a few years it produces usable seed. Whereas lodgepole pine demands light, it stands "side shade" better than does Scots pine. It is highly resistant to strong winds (because of its deep root system). Expensive preliminary soil treatment and tending of seedlings is not required when the sites are carefully chosen. The initial choice of lodgepole seed requires unusual care. Albrecht F. von der Schulenburg. *Paper and Timber* (Finland) 32, 387-92 (1950) (in English).

Structural and Chemical Differences Between Sulphite and Sulphate Pulps

The varying behavior of sulphate (I) and sulphite (II) pulps during mechanical treatment and in chemical conversion is outlined. Whereas certain criteria have been established regarding these differences, explanations hitherto have been unsatisfactory. In general (I) differ from (II) in the following respects: the fibers of (I) are more pliable and yield less transparent sheets; they are far more resistant to beating, show a markedly higher folding endurance and "tear-through" (properties which are ascribed to less shortening of the fibers during the beating operation). (I) show a higher average strength, even when the degree of polymerization (D.P.) is actually lower than that of (II).

Papers from (I) show a considerably greater heat resistance and lose less in strength when converted into paper yarn. Inasmuch as (I) contain less resin and a lower acidity, they have a lowered ion-binding capacity, and a different affinity for basic dyes. Although the pentosan determination leads to higher furfural values in (I), these pulps actually contain relatively small amounts of the more readily alkali-soluble hemicelluloses. (I) require less rosin size, and after swelling, these pulps show no microscopically visible cross or longitudinal cleavages; their swelling values in water are lower, and they are less subject to alkaline oxidation or xanthation. The present paper attempts to explain the reasons for these differences. Unbleached (I) and (II) were formed in the laboratory from the same batch of spruce wood chips, and full tabulated data for the resultant pulps are given. By suitably varying the cooking schedules a (I) pulp with 3.58% lignin and a (II) pulp with 3.60% lignin were formed.

The pulp samples were dispersed by emulsion-xanthation and marked differences with two pulps appeared during the solution process. Of the pulps of practically identical lignin content, (I) dissolved much more rapidly than did (II), and the D.P. of (I) was lower. Evidently the lignin caused far greater inhibition of the process in (II) than (I). The swelling value of

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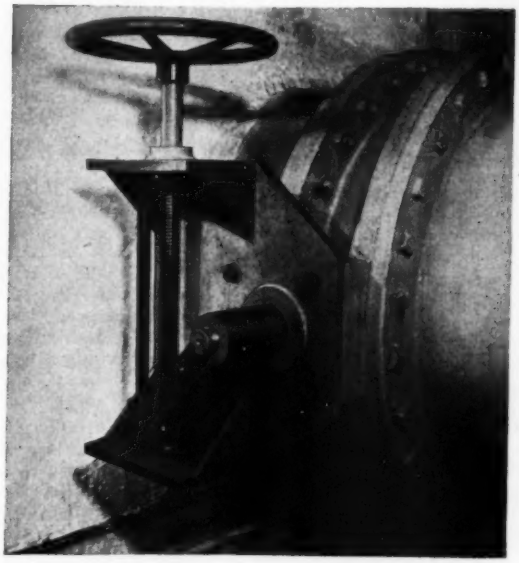

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(I) in water was also lower, a phenomenon correlated with less (readily swelling) hemicelluloses. These differences persisted on delignification with increasing amounts of chlorite. At first both pulps showed increases, and then (gradually) decreases in swelling properties. A swelling maximum was obtained with 15% sodium chlorite for (I) and with 4-8% in the case of (II). Bleaching difficulties in (I) may possibly be traced not only to the lower reactivity of thiolignin but also to its relative inaccessability in the cell wall, when compared with the lignin residues in (II). In either case a sharp initial decrease in D.P. was followed by a steep increase, and a subsequent more gradual decrease.

Marked changes were noted in xanthogenate D.P. with increasing delignification. The first decrease in D.P. which is explained by a rupture of the lignin-carbohydrate linkage was more marked in (I) than in (II). Residues formed on incomplete xanthation of the pulps decrease with increasing delignification. The distribution of lignin between these residues and the xanthogenate solution is very different in (I) and (II). In (I), that part of the pulp entering solution contained 3.1% lignin, and the residue retained 4.7%. No such regularity was shown by (II); here the solution contained 2.8%, whereas the residue retained 11.8% lignin. (II) apparently contains localized, higher concentrations of lignin. This is borne out by the microscopic appearance of the lignin residues after saccharification. Those from (I) form an amorphous mass, whereas those from (II) still show a distinct fibrous structure.

Analysis showed that (I) retained more "true pentosan" but less polyuronides. This accounts for the lower swelling values of (I) and its lower acidity. (I) has a higher % alpha cellulose, and a lower per cent of readily soluble hemicelluloses. The residual lignin in (I) is quite uniformly distributed throughout the entire cell wall. That of (II) appears to be retained on the outermost surface layers of the fiber.

A similar distribution is assumed for the hemicelluloses (which in (II) also retain more uronic acid carboxyl groups). Thus the surface of (I) retains less lignin and fewer and less readily hydrated hemicelluloses (i.e. the "hemicelluloses" in (I) are of higher D.P.). This explains why (I) is less prone to fibrillation and exercises a higher resistance to beating, and develops a greater sheet strength. (II) retains a higher per cent of surface lignin, and low molecular weight (easily swelling) hemicelluloses and fibrillates much more readily. However, these surface fibrils tear off quite readily, forming mucilages, and surface adhesion in the fibers is relatively weak. This, it appears, leads to lower sheet strength in II. In the conversion of (I) the low reactivity (resulting from lowered swelling) must be overcome. On the other hand the more uniform chain length distribution may lead to a more satisfactory end product. In (II) the localized high hemicellulose concentration on the surface leads to unsatisfactory acetylation and to greater amounts of insoluble residues. This is true even when the apparent hemicellulose content in the two pulps is the same (as gauged by the furfural content.

The data furnished examples of the failure of purely chemical analyses to account for differences in the behavior of two pulps which superficially are very similar in chemical composition. Evidently the distribution of the pulp components in the cell wall is of fundamental significance. This distribution is often far more important than are the actual quantities of the non-cellulosic cell wall components. 12 tables, 15 cuts and 35 references are given. Georg Jayme and Andreas von Köppen *Das Papier* 4, 373-8; 415-20 and 455-62 (1950) (In German).

A Study of Sulphite Waste Liquor "Fly Ash"

The authors (who previously had investigated the physicochemical properties of fly ash from pulverized coal) have turned their attention to the fly ash from sulphite waste liquor. The waste liquor had been concentrated to 50-55% in a Rosenblad type evaporator prior to burning, and the fly ash (*I*) was separated from flue gases by a dust collector. The chemical composition of the ash of *I* was not determined. (Scholander, *Svensk Papperstidn.* 53, 35 (1950) however, has published the complete analysis of a similar ash from another source). The apparent ash density was 0.15 gram/ml., and the solubility of *I* in water was 50-55%.

This aqueous solution had a *p*H of 12.4 (using a 5% suspension). After standing six months, the ash solubility had decreased to 32%, due presumably to conversion of the calcium oxide and sulphide into calcium carbonate. Unburned carbon amounted to about 17%. Measured pycnometrically in benzene the average density of the ash was 2.04 (approximately the same as that from coal). By changing the density of a (variable) mixture of butanol and acetylene tetrabromide (at 25 degrees C.) it was possible to fractionate *I* (according to density). Fractionation of the water—insoluble (air dried) component of *I* was shown in a frequency distribution—and in an integral distribution curve, which indicated no especially heavy fraction (like Fe_3O_4 which occurs in coal ash). Photomicrographs of the ash are reproduced. The sedimentation velocity in water increased considerably during the first day and then became constant. (Only about 2.5% of the ash floated on water.) The addition of 0.1% "Teepol" (a petroleum derivative wetting agent) markedly diminished the velocity of sedimentation. Ingvar Jullander and Bertil Olsson *Svensk Papperstidn.* 53, No. 17, 518-21 (1950). (In English)

Recent Views in the Field of White Ground Wood Pulp Manufacture

After discussing means for improving the grinding process, the author outlines his studies on the choice of raw material and its treatment prior to grinding, the suitability of various wood species, the grinding operation, and the screening and refining of mechanical pulp. He also stresses the lack of suitable testing methods for evaluating grinder performance, and the fact that two otherwise unsuitable pulps, when mixed, may prove adequate for special uses. In general, grinding moist wood is advantageous. When high yields are desired, wood rich in summerwood is selected. When pulp of high quality is required, springwood is preferred.

Different wood species should not be ground in admixture, inasmuch as they require different grinding conditions. The woods used were *spruce*, *pine* (I), *poplar* (II) and *fir* (III). Fiber lengths do not play as important a role as is usually assumed. II and III gave pulps suitable for voluminous papers of high basis weight, such as wall paper, and used relative little power. Seasoned I or spruce could be used for newsprint; green I on grinding gave rise to pitch troubles.

For bulky, absorbent papers, dry wood is preferred, whereas for smooth surfaced magazine papers, green, moist wood is more suitable. The importance of pulpstone surfaces is fully discussed, and the conclusion is reached that it is impossible to obtain uniform groundwood quality with a single grinder. For each grinder operating with a freshly burred stone, one with a blunt stone should be operating simultaneously.

Mechanical pulp is considered a two-component system involving fibers and fine-stuff. By varying the percentage of these two components, varying pulp qualities and sheet properties may be obtained. The work of Brecht and Schröter is emphasized and brief reference is also made to some unpublished data of Brecht's with artificial pulpstones which were tested at Darmstadt. Mill techniques used in obtaining desirable furnishes are outlined. Six figures and 19 references. Karl H. Klemm. *Wochbl. Papierfabr.* 78, 567-70; 595-98; 727-31 (1950) (In German).

Aldehyde and alcohol yields in fermented sulphite waste liquor

In the production of alcohol from sulphite wastes, considerable amounts of acetaldehyde are formed and these accumulate in the fermentation liquors. In general this aldehyde is never utilized, but is recycled back to the fermentation vessels with the so-called "foredrops." Efforts have been made to decrease acetaldehyde formation which markedly lowers the alcohol yields. This was not accomplished by any change in temperature (25-37 degrees C.), acidity (*p*H 4.6-5.7) or yeast concentration.

However, approximately 4% more alcohol was formed, provided the "foredrops" were added at the very beginning of the fermentation process and not continuously during the course of the fermentation. More foredrops could be used when the waste liquor undergoing fermentation contained an exceptionally high amount of bisulphite; on the other hand, it was expedient to store the foredrops for future use when the percentage of bisulphite was below average.

Nine graphs and six references are given. The work was carried out in the Research and Testing Institute of the Finnish Pulp and Paper Industries, Helsinki, Finland). Jacobus Sundman and Veronica Sundman. *Paper and Timber* (Finland) 32, 379-83 (1950) (Original in Swedish with English summary.)

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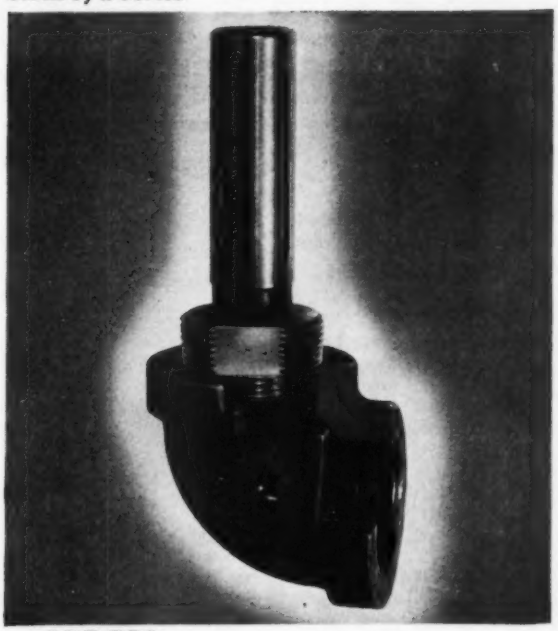

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Trends in the paper box industry

Papers presented by panel speakers at meeting of Chicago TAPPI

(See page 65)

Boxboard

JOE KUBICKA
Container Corp. of America

A major trend in the boxboard industry has been the growing proportion of its output devoted to the production of board used in the fabrication of folding cartons. For the year 1926, production of folding and setup grades was 1,341,300 tons; of this, folding represented 54% of the total. For the year 1949, production of both grades totalled 2,798,700 tons; the proportion of folding had risen to over 76 per cent. Putting it in another manner, the tonnage of setup board has remained relatively level while the demand for folding stock has tripled.

To meet the growing demand, paper machine speeds have been steadily raised; at the same time, increasingly rigid specifications as regards uniformity, printability and other physical qualities have been demanded through fabrication and use requirements. The development of high speed printing cutting, and gluing machinery, as well as parallel improvements in packaging equipment, has placed a premium on the uniformity of such board qualities as basis weight, caliper, rigidity, flatness, smoothness, ink receptivity, etc.

Progress in the production rate and quality of boxboard has been achieved through the work of many hands and minds—the mill operating and technical staffs, the machinery builders and their engineers, the manufacturers of felts, wires, rolls, control equipment—to name a few. Modern developments in board making include such items as improved waste paper defibering and cleaning equipment; more efficient fiber preparation machinery, consistency regulators to attain better uniformity in fiber treatment and basis weight; suction press rolls; sectional drives; instruments for the measurement and control of such critical operating factors as roll nip pressures, sheet tension, drier steam pressure; felts which combine adequate strength and drawings with freedom from excessive sheet marking; equipment for smoothing and machine coating. The foregoing represents only a partial list—a full account of papermaking improvements developed in the last 15 years would be lengthy indeed.

Returning to the original subject of this paper—boxboard, allotted time does not permit an exhaustive discussion of either setup or folding grades. However, since the latter types have commanded the greater interest, the bulk of the ensuing discussion will center around them.

Disregarding color and general appearance, the essential difference between setup and folding board lies in the part of the sheet known as the liner; in folding grades, the liner is required to withstand the stresses of the carton fabrication process without splitting or rupturing. This is accomplished through the proper mechanical treatment of fibers possessing the necessary inherent strength qualities. The fabrication stresses encountered will obviously vary with the caliper of the sheet and the type and size of the carton to be made from it. For example, the liner of an infold carton must necessarily possess greater toughness than that of a large paneled plain caron.

Since end use requirements vary within a wide range, numerous grades of board, both setup and folding, are available to the carton and box fabricator. If his requirements cannot be met through use of any of the so-called standard grades, it is usually possible for the mill to manufacture a product possessing the properties required to meet unusual specifications; these may require a modification of the formula or operating conditions to achieve such results as increased bursting, tear, rigidity, water penetration resistance, or changes in surface characteristics such as color, ink absorption, discoloration resistance, pick, etc.

Before proceeding to a description of the various grades of boxboard, it may be well to repeat the fact, known to every boxmaker, that there may be a considerable quality range in a given grade produced in various mills, different machines in the same mill, or even at different periods on the same machine. This is due to the large number of variables in materials, operation, and personnel which are constantly encountered in papermaking. Needless to state, the goal of every progressive mill is to eliminate or reduce these to a minimum.

The common grades of setup board are known as plain chip or chipboard, news vat, filled news, solid news, and white vat.

Plain chip is usually made as a two-stock sheet, the filler being formed of defibred mixed papers, the liner as a blend of somewhat stronger and cleaner waste fiber.

News vat differs from plain chip in that the top liner is formed of defibered newspapers; this affords a surface of greater color uniformity and cleanliness.

Filled news is produced with both top and bottom liners composed of defibred newspapers.

Solid news, as the name implies, is formed throughout of waste news fibers; its use is desirable when it is important that the filler be free of non-fibrous particles, such as would interfere with a satisfactory die cutting job.

White vat, made with either a chip or news filler, is a popular setup grade featuring a white liner. The liner is usually a blend of groundwood fibers (virgin or waste) and a light-colored, long-fibered stock.

Turning to the folding types, these will be described from the standpoint of their top liners, the characteristics of which usually determine the grade name. The filler plies may be of news, mixed waste, kraft and straw waste, or combinations of these; the specific filler materials used are chosen on the basis of availability and end use of the product. The bottom liner composition may also vary widely, or it may even be a duplication of the top liner.

The following thumbnail descriptions of some of the principal folding grades are necessarily brief, although the object has been to cover the main features.

Starting with consideration of some of the setup grades previously mentioned, specifically the chip and news grades, the strengthening of the liner or liners through the addition of suitable amounts of long-fibered stock results in their conversion to folding grades; these become known as bending chip or bending news vat lined chip.

Omitting the white lined folding types for the present, the colored grades in heaviest demand are the kraft and jute lined chips, mist fibered suitbox board in various shades, sulphite or kraft base lined stock in a wide range of strength and color. Generally, the liner color shade and depth forms the basis for the choice of either a kraft or sulphite furnish; for example a maroon board will usually be made with a dyed unbleached kraft liner, while a bright yellow color requires the dyeing of a sulphite base. The popular mist type of sheet achieves its appearance from the addition of a small proportion of black dyed kraft fiber to a sulphite base liner stock.

Turning to the white lined folding grades, the user's choice will depend to a very great extent on the type of printing job and the degree of whiteness or brightness desired. In order of price, brightness, and printability, the carton fabricator may select a manila, patent coated, super patent coated or clay coated. The last-named is obtainable either as a machine-coated sheet or as the product of the older off-machine process. A general description of the foregoing types is as follows:

Manila: The liner of this grade is usually formed from an unbleached sulphite-groundwood base; the filler and bottom may be either chip or news. The shade can be varied through additions of tinting pigments.

Patent Coated: As compared to the manilas, this board is brighter and smoother. The liner is customarily a blend of bleached and unbleached sulphites, with a bleached soda pulp frequently added for improvement in brightness and opacity. Substantial amounts of clay and starch are also added to the liner furnish to help "close up" the sheet, thus improving the printability. This grade undergoes heavy calendering to obtain the maximum possible smoothness; for this reason, a smooth and well formed filler stock, usually news, is a necessity.

Super Patent Coated: Patent coated of higher brightness, this being the net result of increasing the amount of bleached pulp in the liner and addition of pigments, such as titanium dioxide.

Machine Clay Coated: This grade is a comparatively recent development, making possible the advantages of a mineral printing surface at a cost well under that of the older types of coated stock. While the coat weight is roughly half of that applied by an off-machine coater, the resulting effect

makes this type of board very satisfactory for many high quality printing operations. As indicated by the name, the sheet is coated during the drying process by one or more coating stations located in the drier section.

Clay Coated: Stock is coated by this process after fabrication on the paper machine. The high coat weight possible with the brush or blade type of coater, plus the necessary super-calendering, result in a product which is considered by many printers as superior to machine coated.

Numerous other boxboard grades are available for special purposes, but a description of these would be outside of the limited scope of this paper. An attempt will be made to answer any specific questions during the period following the formal presentations.

One of the most serious problems facing the paperboard manufacturer at the present time is the steadily increasing difficulty in obtaining an adequate supply of virgin fiber. With demand for pulp far outstripping supply, a hectic market condition has developed wherein pulps of any quality—good, bad, indifferent—are eagerly sought. Bad as it now may be, the situation is almost certain to get far worse in the not-too-distant future; among the reasons for this prediction may be mentioned the following:

1. A developing shortage of sulphur, a basic chemical used in the manufacture of sulphite pulps and sulphate.
2. An increasing tightness of the chlorine supply, which will be felt by the manufacturer of bleached and semibleached pulps.
3. Heavy European requirements which will place a drain of unknown amount on our domestic supply.
4. Eagerness of foreign purchasers to pay far over the domestic ceiling prices permitted by present government controls.
5. Military requirements for purified pulp.

Under these conditions, the board mills are being forced to reduce the proportion of pulps in their folding grades and to increasingly rely on making up the deficiencies through the use of so-called "pulp substitutes."

At their best, these pulp substitutes represent the cream of the waste paper stocks; they comprise trimmings and waste in the conversion of sulphite or kraft papers and boards into such items as envelopes, folders, cartons, etc. If care is exercised in the collection and segregation of these various types of waste papers, a fairly satisfactory material for the extension of pulp becomes available.

However, to complicate the picture, an increasing number of mills engaged in the production of the papers mentioned are insisting upon the return (to them) of all scrap resulting from the fabrication process. Thus, they are able to extend their own pulp supply through the incorporation of the returned scrap into their manufacturing process.

Under present conditions, a scramble is taking place for the available tonnage of almost any type of waste that conceivably can be used to stretch out a dwindling supply of pulp. In such a market, considerations of fiber strength, uniformity of color and

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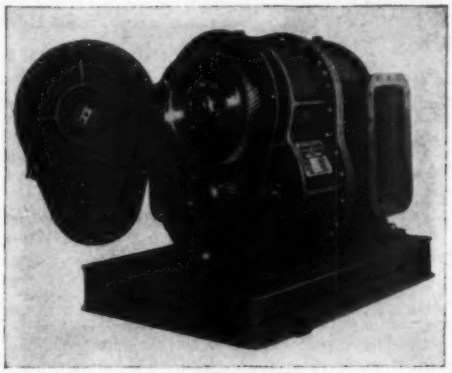

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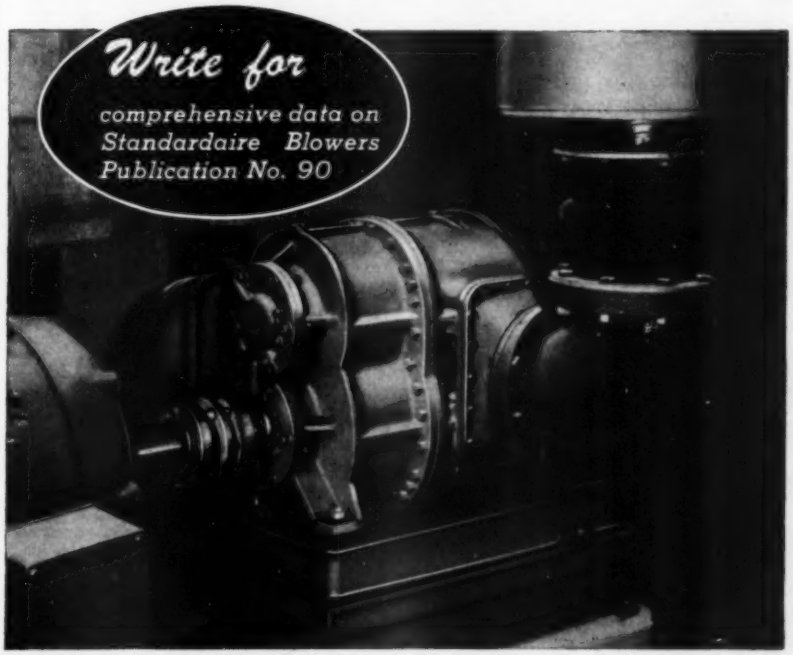

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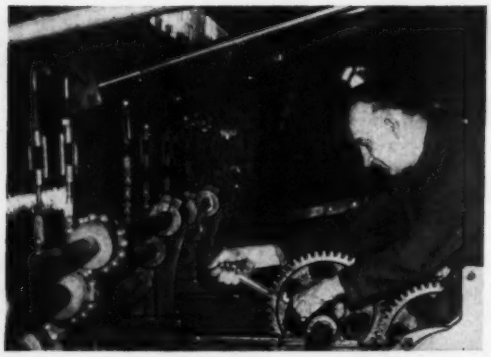

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shade, cleanliness, etc. become of secondary importance. All this adds up to increasing difficulty encountered by the board mill in maintaining past standards of strength, color, brightness, cleanliness, and uniformity of its grades.

Printing & Cutting in the Folding Box Industry

HARRY W. WAHN

Ace Carton Corporation

Although actual printing in the Folding Box Industry is but one of several operations which must be completed in the production of folding boxes, it is of great importance. To the extent that printing has had much to do with the development of our industry as we know it today, a few brief comments on the history of printing in general will serve to highlight major developments and their importance to our industry.

Using carved wood blocks, the Chinese were printing on paper as far back as 105 A.D. It wasn't until the 15th Century that the next major step forward was made with the invention of cast lead type by Guttenberg . . . generally acknowledged as the Father of movable type.

The first printing press came to America from England in 1638, but the next event of real importance didn't occur until the middle of the 18th Century, when Wilhelm Haas of Switzerland made the first cast iron presses and made it possible to manufacture printing presses in greater numbers and at lower costs.

Presses produced during the 18th century and bearing such names as Stanhope, Columbia, and Washington, were all hand presses. When Frederich Koenig of Saxony invented the cylinder press in 1814, greatly increased production speed and consequent reduction in costs really bridged the gap between the earlier handicraft type of printing and of industry we have today.

Compared with the long history of actual printing, the history of the folding box industry is short. An oath for a patent dated April 10, 1879 by Robert Gair, marks the beginning of the folding box industry.

At first folding boxes were intended to merely protect their contents against damage. In the "Cracker Barrel" days, almost every item sold was handled in bulk. The old fashioned grocery store may bring back pleasant memories, but they can hardly be remembered as pinnacles of sanitation.

Because the earliest folding boxes were designed purely from the standpoint of protection, or sometimes for convenience in handling, such as in the case of carpet tacks, printing of these boxes was not considered as too important. Many boxes were used without any printing at all, and even today, a large quantity of folding boxes are made without printing. These boxes have a place in the industry, but tonight, we'll limit our discussion to the manufacture of printed folding boxes.

Folding boxes made early in the 19th century, carried just enough printing to identify the contents, and sometimes not very well at that. As a rule they were printed in one and sometimes in two colors, employing type and occasionally a reverse cut. The board then used, as compared with today's standards, was of poor quality with rough surfaces and only fair bending qualities. The things the box maker could do with this type of stock were limited and, as a consequence, so was the quality of the finished boxes.

The use of these comparatively crude boxes did, however, help establish product identity and brand names. As more and more customers came to look for the familiar box bearing their favorite products, the manufacturers of these products came to realize that their packages in themselves could become valuable selling tools. Each strove to outdo the other in designing better and better boxes for his products to attract more and more customers. "Eye Appeal" became increasingly important in the race to gain product recognition on the dealer's shelves. In a relatively short space of time, the once plain folding box revolutionized merchandising methods and made possible national merchandising and distribution as we know it today. The folding box has become the greatest point-of-sale advertising force in the history of marketing.

In the race for more and more attractive packages, a great deal of pressure was brought to bear upon the box maker. He was constantly called upon to improve his product to meet new demands. The way in which this challenge has been met and problems solved is, in itself, a tribute to the folding box industry. It is essentially the quality of the printing which determines the "eye appeal" of the box, and, therefore, printing is of obvious importance to the industry.

Various printing processes and methods are used in making folding boxes. The most important of these is letterpress . . the oldest form of mechanical printing known. It is estimated that as much as 70 per cent of all printing done in the folding box industry is done by letterpress. It is a relief process by which the raised surfaces of the plates are inked and this ink applied directly to the board by pressure.

The typical cylinder press in use today is probably a familiar machine to almost everyone. They are available for single or multi-color work and in many sizes and kinds. Each has its own advantages and proper uses. Most letterpreses now in use in the industry are of the flat bed cylinder type. However, quite a few rotary presses have now been installed and are proving popular due to increased speed.

In printing an actual box, original plates are first made from finished art work. Electrotype duplicates are then made from these original plates, and are then placed on the press for the actual printing operation. These electrotypes can be made of copper or nickel shells, depending upon the length of the run and the degree to which long plate life will be important.

We must also select the proper type and match the color of ink for the job. Inks with an oil-varnish base are usually used when a varnish over-print is to follow. The over-print varnish serves to enhance the colors of the inks and also to give a relatively scratch-proof surface which is less apt to show finger marks, dust, etc.

Non-scratch inks are also used. They are made from synthetic varnishes and dry very hard, so that they are able to resist scratching and scuffing.

Gloss inks are used to approximate the glossy appearance of over-print varnish but with the saving of one impression on the press and with a resultant savings in cost. This type of ink doesn't offer any protection to the white surface of the box as does overprint varnish.

All of these inks dry through oxidation and require from three to six hours drying time. Continuous attempts are being made to develop inks which will dry at a much faster rate. Heat-set inks, however, have not as yet found a ready acceptance in the

industry due to other problems in connection with their use. For one thing, the surfaces of these inks are not hard enough to resist marring during subsequent operations.

Steam-set inks will set as soon as steam hits the ink, but the applicators used have a tendency to throw water on the sheet leaving spots. In some cases, steam-set inks are being used satisfactorily even without the application of steam. Without steam this ink will dry hard enough to handle in about an hour, but when completely dried will not be sufficiently scratch-proof for many uses.

Offset printing is also used in the folding box industry. In this process the board does not come into direct contact with the plate itself. The grained plate, on which the image or subject to be printed has been etched slightly below the surface, is run in conjunction with a water-acid solution and ink. The water and the ink will not mix. The grain surface of the plate holds the water and repels the ink. The image repels the water and holds the ink. The ink is transferred by a very light impression to a smooth rubber-blanketed cylinder which, in turn, comes into contact with the board, and transfers the ink to it.

Offset will print fine halftone screens on fairly rough surfaced board and deliver quality which could not be matched by letterpress printing on similar stock. Offset printing presses also operate at higher speeds than letterpresses. With this process there is a saving in plate costs and make-ready time.

Rotogravure, a relative newcomer, is a process by which the design to be reproduced is etched into a copper plated cylinder which can later be chrome plated, if the length of run makes it practical to do so. The depth of etching determines the amount of ink that is applied to the board. The cylinder is run in a bath of ink. A scraper blade removes all the ink from the surface of the cylinder, leaving ink wherever the cylinder has been etched in. As the cylinder comes into contact with the board, this ink is transferred to the board. As the board runs through a heat chamber, the ink, being very volatile, dries instantly. These presses can be set up in sections to print as many colors as are desired. Most rotogravure presses are web fed and run at an even higher speed than offset presses.

Rotogravure presses, in the folding box industry, are sometimes equipped with rotary dies so that the box blanks are cut right along with the printing as a continuous high speed operation. This is limited, however, to extremely long runs because of the very high cost of rotary cutting dies.

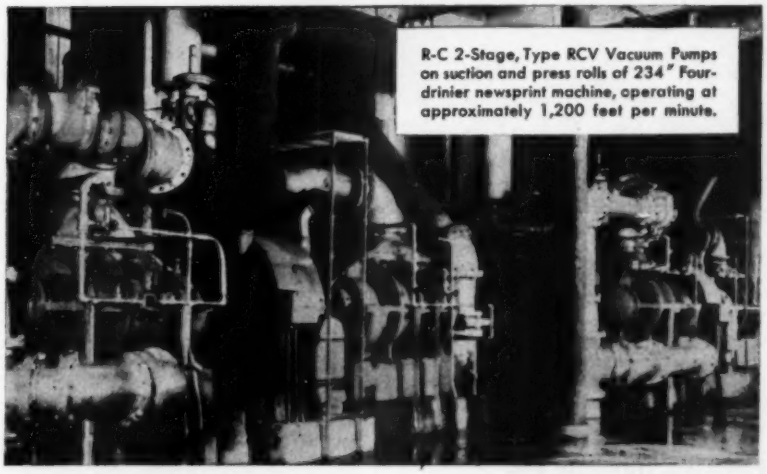
In the majority of cases, box blanks are formed during a separate operation known as "cutting and creasing." The dies are made very accurately and are locked in a steel chase which is put on a cylinder press similar to a one-color printing press, but without rollers, ink fountains, etc. On smaller jobs, platen presses are usually used.

The typical die consists of a number of cutting and scoring rules, spaced with ply wood or steel blocks to form the panels, tucks, and flaps of the box. The cutting rules cut the blanks to shape and the scoring rules add the creases for bending. In a typical set-up using a cylinder press, the dies are locked in the bed of the press. A "counter" of tough board is then glued to the steel jacket of the cylinder and grooves are cut to form a female die for the scoring rules. The counter, is removed every place the cutting knife strikes the jacket. In operation, as the board feeds through the press, the cutting rules shape the box and the scoring rules push the board into the female die to form creases along the lines where the board will bend.

After the job has been completely made ready, it is necessary to put nicks into the cutting knives, so that they won't cut all the way through in a number of places. This holds the sheet together through the cutting press. These nicks, which are put in with a grinder or a chisel, are naturally kept as small as possible.

If the blanks are to be later stripped with an air hammer, more care must be used in placing the nicks than is the case when hand stripping is to be done. Those responsible for cutting and creasing operations must work very closely with the stripping department to assure smooth operation.

In making small boxes, it is sometimes desirable to use cut scores instead of creases. In such cases, all rules in the die have cutting edges, only those intended to form cut scores are approximately half



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the thickness of the board lower than the actual cutting edges. Cut scores, cut about half way through the stock, relieve stress on the corners of the box, and allow the box to be set up easily and with squarer corners.

When the boxes are to be filled by automatic machinery, the die must be very accurate and perfectly square. At the Ace Carton Corp., we follow the practice of numbering each individual die. We then run about a hundred samples from each die in advance and have them checked with the filling equipment to be used. We can then make corrections wherever needed.

To illustrate the importance of accuracy in producing boxes for machine filling, tucks must be most accurate. If they are too loose, they will not stay in position after running through the filling machine. If they are too tight, they will be crimped by the machine.

The type of board also is important. It can be too stiff or not stiff enough, depending upon the use to which it is put. The filling machinery cannot compensate for too wide variation in the box. Naturally when boxes are to be hand filled, this is not quite so critical.

There are hundreds of other things to consider in the printing, cutting, and creasing operations necessary in the folding box industry.

This has been a rough and very brief discussion at best and has been aimed primarily at establishing the basic factors in producing the high quality folding boxes of which our industry is justly proud.

Finishing, Handling and Production Methods

JOHN REDPATH

Chicago Carton Company

The basic development of the carton industry had evolved from the development of two pieces of equipment used in the industry, namely: the cutter and creasing press and the automatic folder and gluer. Without this development of these two pieces of equipment, there would be no such industry as we know it today; following this development of the folding paper box a major change in the technique of retail distribution of merchandise the world over has occurred.

For instance, few packaged items appeared on the shelves of stores in the 1800's—most foods and goods were sold from bulk—customers carrying them home in paper bags. By 1910 unit packages had come into their own but bulk goods had still not passed from the scene. Today the packaging of goods is relatively complete as evidenced by a tour of your neighborhood super market.

Let's go back into history and see just what these major developments were that started us on our way to the point at which we are today.

In 1839 Colonel Andrew Dennison started making boxes in his home in Brunswick, Maine, with the aid of a cobbler's bench and a shoe knife cutting out set-up paper box blanks with his daughters finishing the boxes after he cut the blanks.

Colonel Dennison produced a corner cutting machine in 1844 which eliminated the hand cutting of corners and started a new era in box manufacturing which has not yet stopped.

The next great development and the greatest one upon which this industry developed was the invention of the cutting and creasing process by Robert Gair in 1879, in which he converted an Aldine Press to cutting and creasing. This press utilized one basic technique that today still remains unchanged in carton production, in which cutting knives and creasing rules are made into dies outlining the shape of the carton blank and locked into chases. This original press could cut blanks at the rate of 750 sheets per hour with as many as ten units on the sheet.

Still in these early days the seams of the cartons were stitched and later hand glued, but by 1895 an automatic gluer was developed and the first automatic gluer and folder was in use by 1904 gluing and folding cartons at the rate of 150 per minute.

In 1905 the E. G. Staude Manufacturing Co. brought out an automatically fed gluer and folder with a counting device, and in 1912 the International Paper Box Machine Co. developed a paraffining machine.

With these developments we were on our way to the industry as it is today.

Subsequent developments in machinery, materials and plant layouts have been all towards one end to make better cartons in greater quantities, more efficiently and at lesser cost.

To give you an idea as to the productivity of a plant in the late 1800's, as compared to a large sized modern one, a foremost plant then turned out 20,000 boxes per day with 200 workers compared to a large plant today turning out 5,000,000 boxes per day with 500 workers.

What has achieved this? Basically, newer, better, bigger and faster equipment, but of the same old tried and proven techniques of years ago. The work horse of the industry is the flat bed cylinder letterpress, printing press and the flat bed cylinder cutting press, taking large size sheets of paperboard. These presses are readily adapted to quick change of jobs and can print or cut any type or size of folding box that is practical to make. They will take a sheet size approximately 46 x 70 inches and run at speeds of 1200 to 2000 sheets per hour. Supplementing this basic equipment are printing presses capable of running 5000 sheets per hour with four and five colors, or again printing presses capable of running paperboard in web form at even higher speeds. Again the same supplemental developments have occurred with cutting presses. We now have workable automatic carton blank stripping devices which can be attached to standard cutting and creasing presses, which in most instances strip away all the wastage only leaving the carton blank to be broken up with the aid of pneumatic air hammers especially adapted for the job.

We have automatic cutting and creasing of paperboard in web form, the web being printed or unprinted at speeds of from 100 to 300 impressions per minute. The blanks further being automatically stripped and delivered on a conveyor belt. Such machines are usually specialty machines constructed for specific types of cartons.

Again our automatic gluing and folding machines are built to produce a variety of types of cartons at high speed. It is a far cry from the first automatic gluer producing 150 cartons per minute to that of today, producing anywhere from 200 per minute to 2000 per minute at belt speeds up to 1200 feet per minute.

Specialty gluers that will produce up to 24,000 cartons per hour, gluing many cartons you see in everyday use, such as bakery trays and small parts boxes which are opened by the flick of a hand. One of these machines

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will now produce more cartons in an hour than a whole factory could in one day, fifty years ago.

Along with this, in order to handle this volume of material, equipment familiar to all industry such as electric fork trucks, electric cranes, skids, pallets, and conveyors are necessary.

This is a picture of the development and trend in the folding box industry, a familiar picture of American enterprise which started out with a cobbler's bench one hundred years ago and is now a necessity to our way of life.

History of the Industry

(a) Basis of Development of the Industry

(1) Cutter and Creaser
(2) Automatic Gluer

(b) Significant Developments of Equipment

(1) 1839—Cobbler's Bench — Col. Andrew Dennison
(2) 1844—Corner Cutter—Col. Andrew Dennison
(3) 1879—Cutter and Creaser—Aldine Press—Robert Gair — 750/hr. 10 up
(4) 1895—Automatic Gluer — Munson Plant
(5) 1904—Automatic Gluer and Folder —150/min.
(6) 1905—Automatic Gluer, Folder and Counter—E. G. Staude
(7) First Cutter and Creasers converted printing presses
(8) 1912—Paraffining Machines by International Paper Box Machine Company
(9) 1939—Air Hammer Stripping
(10) 1949—Rotogravure Sheet fed printing on paperboard
(11) 1949—Automatic Stripping device by Miehle
(12) 1950—Continuous web printing, cutting

TAPPI Abstracts

Abstracts on these pages are from papers presented at the annual meeting of the Technical Association of the Pulp and Paper Industry held in New York City, February 19-22, 1951.

New Developments in Starch Adhesives, by J. E. Killinger, Penick and Ford, Ltd., Inc., Cedar Rapids, Ia. (Corrugated Containers Session)

A new process employing a small percentage of alkali-setting resin is described for stabilizing corrugated starch viscosity. The stabilization process is carried on at the time the corrugated starch is prepared at the user's plant. Formulas are given for both regular and waterproof types.

The claims of United States patent 2,450,377 (Starch-Resin Reaction Product and Method of Producing Same) are discussed and the addeterminations of alpha, beta, and gamma-cellulose; copper number; *p*H; rosin; cuprammonium fluidity; and the heat stability test.

It has been found that MR generally increases the alpha-cellulose fraction, through resin bonding; the increase ranges from 0 to 3% alpha-cellulose, depending on the original alpha-cellulose content of the fibers and on the amount of the resin added. The change occurs at the expense of the beta-fraction, the gamma portion being unaffected. Seventy-two to 85% of the MR remains in the alpha-cellulose portion. Owing to this distribution of the resin in approx-

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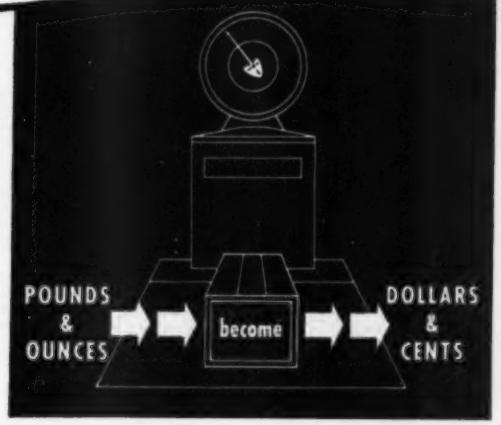

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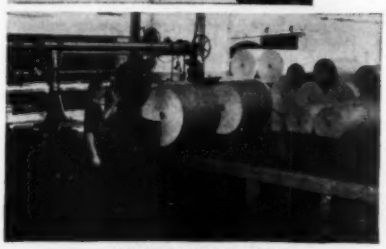
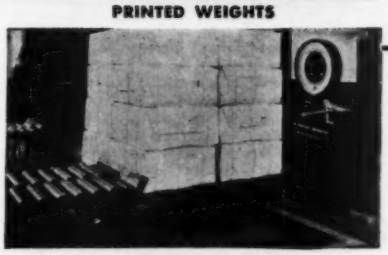


PRINTED WEIGHTS



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imately the ratio of the alpha and the beta plus gamma-fractions, the correction for consumption of dichromate by the resin in the volumetric determination usually has a negligible effect.

The MR causes a slight decrease (0.2 to 0.4) in copper number; papers having a degree of polymerization without MR of 1000 or more become partially insoluble in cuprammonium solvent, so that viscosity measurements are rendered meaningless; the analysis for rosin is not affected. It is shown that during hot water-extraction MR releases alkaline decomposition products; consequently the hot-extraction *p*H of a paper may be higher, lower, or equal to the cold *p*H, depending on the relative amounts of alum and MR present.

The state of cure of the resin does not appear to influence the alphacellulose value and copper number in the same manner as it does the fold endurance during the heat stability test. As measured by the changes occurring in alpha-cellulose value and copper number, MR exhibits a tendency to stabilize papers. Further work is necessary before the heat stability test can be used as a satisfactory measure of the relative permanence of papers containing synthetic resins.

Determination of Total Non-Aqueous Constituents in Pulp Mill Liquors, by J. H. Phillips, Babcock and Wilcox Co., Alliance, Ohio. (Acid Pulping Session)

The need for more reliable laboratory data for use in establishing accurate material and heat balances in the several pulping processes in the paper industry is emphasized. The problem of obtaining a reliable value for the "solids" content of residual liquors is discussed and a definition for "total non-aqueous constituents" is given. The suggestion is made that such a term be used in place of "total solids" in order to include gases and volatile liquids with the combustible portion of the liquor. This new definition and concept presents the problem from a different point of view and stresses the importance of developing a method for determining water completely independent of all other constituents in a liquor sample.

A review of the literature on methods of "moisture determination" and methods of "total solids determination" in other industries as well as the pulp and paper industry is included and a discussion of the pros and cons of methods currently used in pulp mills is given.

A method for the determination of total water in residual liquors is described. This method is a modification and adaptation of the well known Karl Fischer titration. This method enables the user to obtain a more true value for the water content of a liquor independent of the composition or amount of the "total non-aqueous constituents" present.

This method is proposed with the acknowledgment that because of insufficient time exhaustive laboratory testing has not been completed and there are quite likely instances where slight variations of procedure will be necessary. However, it is presented along with the problem confronting the industry for the benefit of those who wish to try it. The data given indicate excellent sensitivity and reproducibility, but since there is no existing method by which completely satisfactory data can be obtained, no direct evaluation of accuracy can be made. However, comparison of results obtained do show slightly lower percentages of water by the titration method than those obtained on identical samples using an "oven dried solids" method but they are of the same order of magnitude. The slightly higher value obtained for water by oven dried methods can be attributed to the release of volatile liquids and gases from the liquor.

The Microscopy and Identification of Synthetic Fibers, by F. D. Houghton, American Viscose Corp., Marcus Hook, Pa. (Microscopy Session)

This paper presents the simple microscopy of the major synthetic fibers (viscose, acetate, and cuprammonium rayons, Nylon, Vinyon, Orlon, and glass) along with chemical and staining tests for confirmatory purposes. Other new fibers are omitted because of their infrequent occurrence in the paper industry.

The general appearance of each fiber under the microscope is illustrated with drawings and photomicrographs and a systematic scheme for analysis is presented. The entire presentation is designed to help the paper chemist with the identification of synthetic fibers, using a miscroscope and a minimum of chemical equipment, making special techniques and equipment unnecessary.

PVA Adhesives, by E. G. Boyce, Grasselli Div., E. I. du Pont de Nemours & Co., Inc., Cleveland. (Corrugated Containers Session)

A vinyl base adhesive, such as DuPont Adhesive No. 77, provides an adhesive for specialized or intermittent use for making weatherproof corrugated board with a minimum of preparation and specialized equipment. Certain operating practices must be followed to assure the production of well bonded board. The higher cost of this type of adhesive means that its greatest and general field of use will continue in the solid fiber and specialty laminating fields where its operating characteristics are outstanding. More widespread use in the corrugated board field can be predicted with future developments that tend to lower unit consumption of adhesive and provide additional improvements in bonding characteristics for this particular operation.

The Microscopic Identification of Paper Fillers, by Harold C. Koch, C. Edwin Brandon, and Kenneth P. Geohegan, Howard Paper Mills, Inc., Dayton, Ohio. (Microscopy Session)

The identification of mineral fillers in paper is done readily and quickly with the aid of a microscope. The methods of chemical microscopy are rapid and convenient to use. Procedures are given for the recognition of the more common paper fillers, namely: diatomaceous earths, talc, clay and compounds of calcium, zinc, barium, and titanium.

Diatomaceous earths, talc and clay are recognized by the appearance and size of the particles, when viewed under the microscope. The diatomaceous earths, being the fossil remains of microscopic plants, have characteristic shapes and symmetrical markings. Talc particles are irregular and usually larger than those of clay. Clay is further identified by the presence of flate plates of kaolinite and mica.

The presence of calcium compounds is recognized by the formation of characteristic crystals of calcium sulphate or of calcium iodate. Calcium sulphates form needlelike crystals which tend to grow into characteristic arrow tail formations. Calcium iodate crystallizes in distinctive, colorless, diamond shaped crystals.

Zinc thiocyanate crystallizes in the form of feathery crosses which appear black by transmitted light.

Barium sulphate, recrystallized from fuming sulphuric acid, forms crystals which appear as feathery crosses with a marked tendency for two of the adjacent arms to be longer than the other two.

The confirming test for titanium is an adaptation of the qualitative color reaction without the use of the microscope.

Pulping of Waste Paper and Pulp in the Dynopulper, by G. A. Peterson, Rice Barton Corp., Worcester, Mass. (Preparation of Papermaking Materials Session)

The principle called "dynomizing," which is a coined word, is used to denote the singular and original treatment given to papermaking fibers and is used exclusively in various types of Dynomachines.

Two or more Dynopellers are used in each Dynomachine. The Dynopeller consists of a cup disk, mounted on a horizontal shaft and inserted in the vertical ends of a vat. At the periphery of the disk on the concave side a 10-inch strip of sharp diamond hard particles are welded. When the Dynopeller rotates it acts in a similar manner to the impeller of a centrifugal pump, drawing the stock to its center, the centrifugal force set up causes the stock to flow across the sharp roughened area under a slight hydraulic pressure which tears and pulls the fibres apart, this work being done without cutting or shortening the fibers.

All types of waste papers and pulp are very quickly reduced to slush form in the Dynomachine, the treatment continued in the machine until such time as all small particles of paper and fiber bundles are separated into individual fibers.

A Rotary Pick Tester, by Walter W. Roehr, Kimberly-Clark Corp., Neenah, Wis. (Graphic Arts Session)

In the printing of both coated and uncoated book papers, the proper pick resistance or surface bonding strength is necessary if optimum printing quality is to be obtained. Until recently the available test methods have not been entirely satisfactory, particularly for some types of pick and on certain types of paper. The present development was undertaken in an effort to construct an improved testing unit and is based, in part, on bonding strength work done by the Institute of Paper Chemistry (Instrumentation Program Report No. 31, Part III). The instrument was designed to simulate to some extent, actual printing procedures and to provide sufficient control of the known variables to permit keeping the tester in statistical control. Fundamentally, it consists of a stationary, rubber-covered impression roll (to which one or more test samples are attached) and a movable black Carrara glass plate carrying a uniform film of the picking fluid. This arrangement is similar to that of a flat bed cylinder printing press. The plate is driven by a specially designed cam which produces a variable speed proportional to the distance traversed. For the picking medium a Newtonian fluid, such as blown castor oil, is preferred.

On the theory that the tensile stress applied to the sample surface is proportional to the viscosity of the fluid used and to the speed with which it is pulled away from the surface, a judicious choice of speed range and viscosity permits one to obtain a pick number for every sample run. Among the variables which were found to influence test results are relative humidity, temperature, film thickness, and nip pressure.

The Influence of Temperature During the Beating Process, by O. K. Ronning, E. D. Jones and Sons, Inc., Pittsfield, Mass., and C. E. Libby, New York State College of Forestry, Syracuse, N.Y. (Preparation of Papermaking Materials Session)

Strong unbleached sulphite pulp was beaten in a Noble and Wood laboratory beater at various constant temperatures (5 to 80 C.). The beater was equipped with a surrounding jacket containing a colling or heating medium for temperature control.

Experiments carried out at 4% consistency on pulp added to the beater in wet laps, showed a gradual increase in beating time to reach the same freeness (or drainage time) when the temperature was increased. The relationship between freeness and drainage time was found to be influenced by the beating temperature in such a way that the drainage time corresponding to a certain freeness was decreased as the temperature was increased. Initial greaseproofness occurred at a lower drainage time when the temperature was lowered. The best average strength properties of the handsheets resulted from moderately high beating temperatures.

When the same pulp was added to the beater in an air dry condition, the shortest beating time did not appear at the lowest, but at an intermediate beating temperature, around 30 C. The beating time necessary to reach the same drainage time was increased for all temperatures compared with similar runs starting with wet pulp. The trend in relationship between freeness and drainage time was the same. The appearance of the greaseproof point was greatly delayed. Burst and tensile strength values were considerably lower, while the tear and bulk values were higher.

Beater runs carried out at 2.5% consistency on wet pulp furnish showed that a longer

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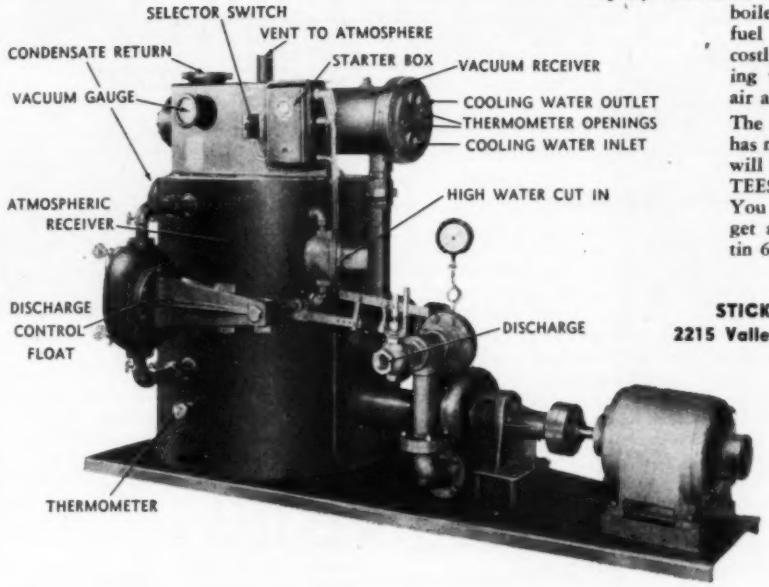

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specific beating time was found necessary at all temperatures in order to reach a certain drainage time, compared with beater runs at 4% consistency. The change in consistency did not to any great extent alter the trends of the strength properties. An attempt has been made to explain the reason for the difference in results obtained in the various investigations on beating temperature.

Description and Action of the Morden Slush-Maker Pulper, by R. Burke Morden, Morden Machines Co., Portland, Ore. (Preparation of Papermaking Materials Session)

The Morden "Slush-Maker" for pulping, mixing and preliminary beating was conceived by C. W. Morden, as a logical and desirable addition in the stock preparation field.

Some 15 years ago his conception of the "Stock-Maker" for continuous beating and refining more efficiently and effectively replaced the beating function of the beater. Now the "Slush-Maker" has been designed to replace the beater's functions of pulping, breaking, slushing, mixing, brushing-out, and treating various pulp furnishes either on a continuous or batch basis.

During the design and development of this unit over the last five years, many other pulping units have been introduced into the field. However, the "Slush-Maker" embodies principles that differ from these units. The theory underlying the "Slush-Maker's" process development being that such a unit must not only quickly and efficiently give the initial disintegration to the material, but that once this point was reached, the action of the unit should be readily controllable so that remaining flakes and bundles can be readily brushed out of the stock, color, and other additives mixed and brushed in, furnishes blended and, if desired, given a general preliminary treatment.

To accomplish this variety of actions it was determined that, just as in the beater, some controllable bar to bar action was essential. In the "Slush-Maker" there is not only a disintegrating or shredding disk but in addition there is an attritioning surface wherein bar settings, for a variety of treatments, can be adjusted or maintained as simply as in a beater or refiner.

To adequately study the action of these principles on a wide variety of materials, a pilot machine was built to handle 150 pounds of air-dried stock at 5% consistency.

Illustrations will point out how the unit is constructed to accomplish this complete disintegration of the stock as well as some of the test results on a variety of pulping operations. Larger units are being designed, based upon experience with this first unit, which will embody all of the basic features outlined herein and the operation of these units will naturally add to the data already accumulated.

This pilot model is set up in a laboratory in Portland where at any time trials can be run on any pulps that the industry cares to submit.

A Proposed Card Sorting System for the Indentification of Pulpwoods, by B. Francis Kukachka, Forest Products Laboratory, Madison, Wis. (Microscopy Session)

In a recent issue of *TAPPI* (33, No. 9:66A) a universal scheme for wood identification was outlined showing how it could be applied to the identification of species used for pulp and paper. It is, of course, obvious that such a scheme would necessarily be limited in its use to institutions having the necessary IBM equipment. It is apparent also, that a universal key can be used to greatest advantage only when hundreds of species must be taken into consideration and from many foreign countries. Since the pulp and paper industry concerns itself with relatively few native species, the problem of identification does not require the use of a complex, through rapid, system for identification.

A method making use of marginally perforated cards is proposed which aims to simplify and speed the work of identifying the species used in pulp and paper manufacture. The method uses cards having a series of perforations along the margin. Each perforation is assigned a diagnostic character used in identification. The presence of a feature is indicated by notching the card at a particular perforation and its absence by leaving the perforation intact. In actual operation, a short metal rod is passed through a pack of cards at the desired perforation and the pack is then supported by the rod so that cards bearing notched perforations fall from the pack. The number of times this process must be repeated to arrive at an identification will depend largely upon the skill and experience of the operator, but will give equivalent results even if the shortest possible route is not followed.

The method of operation is essentially that used in the IBM card sorting scheme and gives the operator the choice of using characters most apparent to him. As with the IBM Key, the number of species contained within the body of key can be increased or decreased as need requires.

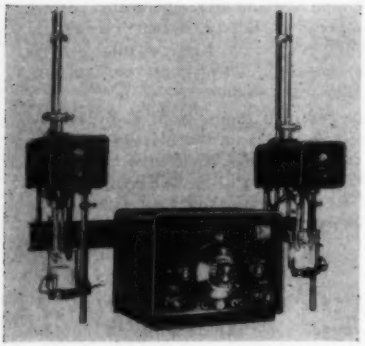
Nomographic Assistance in Statistical Calculations, by W. E. Patte, E. B. Eddy Co., Hull, P.Q. (Statistics Session)

This paper submits two nomographic charts to facilitate common calculations in industrial applied statistics.

The first chart enables the precision of an average to be estimated graphically from the number of individual results making up the average, and the range or spread, of the individual results. A tolerance, e, is thus obtained for the observed average X, so that the "true" average may be expected within the interval $X \pm e$. This precision, $\pm e$, is associated with reliabilities of 95 or 99.9% according to the scales utilized on the chart.

The second chart solves graphically the common equations in statistical control work. Included are the relationships, of average and extreme ranges displayed by groups of results to the standard deviation of the individual results, and of the standard deviation of individual results to the standard error of averages, for groups comprising up to 15 individual results.

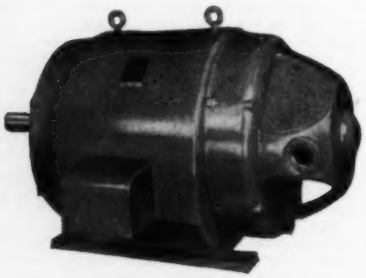
The Paper Industry New Products



Automatic Titrator

The Beckman Automatic Titrator handles routine titrations completely automatically, thus releasing the laboratory technician from manual titrations. Operation consists of merely filling the burette, placing the sample in the beaker and raising the beaker holder into position. The stirrer motor automatically starts, and titrating solution is delivered into the sample. When the end point is reached, delivery of the titrating solution automatically stops and a light shows completion of the titration.

The instrument uses standard Beckman glass electrodes that are virtually unbreakable. Control and titrator units are enclosed in all-metal cases that require minimum attention. In addition to its use as a titrator, the instrument can also be used as a *p*H meter to give accurate readings over the range 0 to 14 *p*H, and to provide millivolt readings over the range from −600 to +1400 mv. Beckman Instruments, Inc., South Pasadena, Calif.



Flexible Heavy-Duty Motors

A new line of heavy-duty, wound-rotor induction motors provide variable speed drive, and are also useful on applications requiring high starting torque and low starting current, or long acceleration periods. Either ball or split-sleeve type bearings are available.

Construction is of fabricated steel with high physical impact strength. Drip-proof construction is standard; splash-proof or enclosed, forced-ventilation models are also available. All parts are easily accessible for inspection and maintenance. The picture shows a 200 hp., 1750 rpm model; others are built in ratings from 30 to 1500 hp. Electric Machinery Mfg. Co., Minneapolis 13, Minn.

Filtering Membrane

Two new features make this "Well-Screen" membrane for filters an innovation in industrial filtration. The membrane is a cylindrical shaped screen which fits inside the filter to support the filtration medium; and the wires making up the screen have a triangular cross-sectional shape to eliminate clogging. Greater efficiency in the Titeflex filter is thus insured. Another advantage is that in backwashing, Well-Screen membranes achieve high efficiency because the back-wash flow reaches its highest velocity at the exact point of support of the filter medium. Available in 316 ELC stainless steel or made in any alloy which can be drawn into wire. Titeflex, Inc., 500 Frelinghuysen Ave., Newark 5, N.J.

Gaskets

Style T gaskets are perfect seals for boiler handhole and tubecap cover assemblies, and can be reused many times if not removed from cover assemblies during outage. They require no compounds, due to the exclusive Spiral-Wound feature, which gives the gaskets a resilient action, permitting them to rebound when they are not under pressure. Long service is thus assured.

Style T gaskets are available in two thicknesses: .125 in. for use with assemblies having narrow seating surfaces and high bonding loads; and .175 in. for use in assemblies having broad seating surfaces and low bonding loads. They are made of low carbon plated steel and Canadian asbestos filler and type 304 stainless steel and Canadian asbestos filler. Non-standard styles are available or can be designed.. Flexitallic Gasket Co., Eighth and Bailey Sts., Camden 5, N.J.

Stretch-Resistant Belt

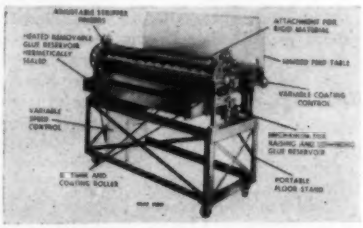
A layer of rayon tire cord cemented between two layers of leather belting assures stretch-resistance in the Schieren Duxbak Rayon-Core belting. Some users of such belts have reported six months to a year of operation without any take-up.

The Rayon-Core belt can be scarfed and made endless with the same ease and the same methods as any other flat leather belt. Regular belt fasteners or lacing can also be used in the customary manner. Rayon-Core belt has the same degree of salvage-ability as ordinary belting and can be handled in exactly the same way. Chas. A. Schieren Co., New York, N.Y.

Spurtless Spray Gun

To prevent spurting when handling heavy coatings, the new Mogul Powerflo pump is equipped with a device called the Evenflo. With it, surfaces can be coated evenly with many industrial fluids and semi-fluids, including rust preventives, calking compounds, adhesives, undercoaters, and even gummy mastics.

The pumps are air operated within a pressure range from 20 to 175 psi, and supply the spraying materials through hoses direct from any original 400-lb. or 100-lb. drum, or from bucket-type containers. The Mogul pump weighs only 35 lb. Gray Co., Inc., Industrial Div., Graco Square, Minneapolis 13, Minn.



Gluing Machine

A new gluing machine is designed for applying uniform glue coatings to flexible or rigid materials up to ⅜ in. thickness. It will accommodate widths up to 46 in., and its cast iron roller construction assures rigidity over the full width.

An adjusting feed table accommodates cardboard or flexible materials. The glue tank is hermetically sealed and thermostatically controlled, insuring uniform distribution of heat. A patented dial glue coating control accurately measures adhesive. Dimensions are approximately 69 in. wide, 45 in. high and 24 in. deep. Potdevin Machine Co., 1285 38th St., Brooklyn, N. Y.

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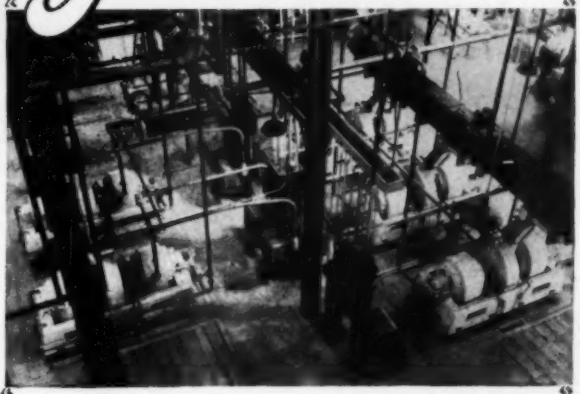
Semichemical chips defibered by 5 Bauer Pulp Refiners



The above reproduction fails to do justice to one of the most spectacular commercial photographs we have ever seen. It was taken by Lefebvre-Luebke at the new mill of Green Bay Paper & Pulp Company, and is published by us with permission.

Here are five Bauer Pulp Refiners arranged in lines of three and two machines respectively. Semichemical chips are fed to the refiners through chutes. Each chute is equipped with a Bauer Permanent Magnetic Separator for removing tramp iron. Water is added to the chips by showers in the chutes to effect the desired consistency for fiberizing. Subsequent showers are used for further diluting the pulp.

This is an example of the hundreds of Bauer Pulp Refiners in operation throughout the world for pulp and stock processing. The materials treated include raw, steamed, extracted, or semichemically cooked chips; many types of screen rejects; raw pulp, old paper, straw, and numerous kinds of fibrous residues.

For complete information, read our bulletin No. P-1. A copy will be gladly sent upon request. Write, wire, or phone us.

Bauer

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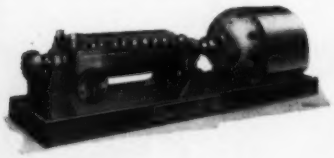
in a wide variety of shapes and analyses. The types of steel manufactured in this form include various standard SAE and AISI carbon steels, case hardening steel, standard mild steels and free cutting steels. The bar stock is cold drawn and cut into special sections.

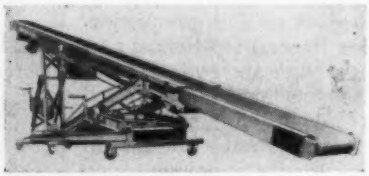
A catalog showing parts and explaining their use is available from the distributor, A. Milne & Co., 745 Washington St., New York 14, N.Y.



Centrifugal Pumps

This new line of multi-stage centrifugal pumps, designated Class HMTA, is built for high-pressure applications to 1200 psi and capacities to 1600 gpm. Applications cover a wide range of boiler-feed, pipe-line pumping, refinery and other high-pressure services.

The new design features are a cylindrical-bore, horizontally split casing and compact, unit-type rotor assembly. The entire rotor assembly is quickly and easily removed from and installed in the smooth-bore casing, and contains the shaft, impellers and channel rings. The pumps are built in 3-, 4-, 5-, and 6-inch sizes with from 3 to 9 stages. Ingersoll-Rand Co., 11 Broadway, New York 4, N.Y.



Adjustable Conveyor

Adjustoveyor is a movable, adjustable conveyor that can be operated in ten different positions. Package handling and material handling in many applications can be done by this device; and it is suited for high and low operations, for elevating between floors, and for stacking in piles. Both its extending feature and its withdrawing boom, which can go over aisleways, make it adaptable for use in many positions.

It is available in all standard belt widths, and in a slide type or roller type. Standard lengths are 8 ft. closed to 14 ft. 6 in. open; 10 ft. closed to 18 ft. open; 15 ft. closed to 27 ft. open; 20 ft. closed to 38 ft. open; and 32 ft. closed to 55 ft. 6 in. open. Stewart-Glapat Corp., Zanesville, Ohio.

Heat Exchanger

"Econalloy" describes this new heat exchanger, in which corrosion resistant materials are used only where required: as flange inserts and for the inner tube which contacts the fluid or vapor being heated. It forms an integral part of the piping system, and thus also saves space.

An important feature is that a corrosion resistant joint is made without welding to the inner tube. The alloy inner tube is expanded into prepared serrations in the insert flange by special torque limit tools which prevent undesirable stresses and eliminate the use of heat, which would change the grain structure of the alloy and lower corrosion resistance.

The Econalloy line is available in sizes from a fraction of a square foot of heating surface to several hundred square feet in lengths up to 30 feet per segment, and for pressures up to 900 lb. per sq. in. and temperatures in excess of 700 F. Martin-Quaid Co., 1875 Sedgley Ave., Philadelphia 32, Pa.

Midget Feeder

The Model 50-8 Midget Belt Gravimetric feeder weighs and feeds dry chemicals continuously. Its small proportions include an 8-inch belt, a 1-foot weigh span, and a capacity of 3 cubic feet per minute.

A single ¼ hp. motor powers the mechanism, which also features a feeding range of 100 to 1, infinitely variable speed transmission, and an automatic alarm device. Operation is automatic, and high accuracy is assured. Omega Machine Co., 345 Harris Ave., Providence, R.I.

Fluorine Chemicals

As part of its fluorine research program, the Pennsylvania Salt Manufacturing Co. is now manufacturing in experimental quantities for evaluation purposes the first three of a series of organic sulfonyl fluorides. They have been shown to be thermally stable and resistant to hydrolysis, chlorination, oxidation and elevated temperatures. They show an unusually wide range of solvent properties. Because of these and other properties, they are recommended for evaluation as solvents, heat transfer agents, intermediates in the manufacture of dyestuffs, and chlorination media.

The three sulfonyl fluorides are benzenesulfonyl fluoride, p-chlorobenzenesulfonyl fluoride and m-nitrobenzenesulfonyl fluoride. In addition to experimental quantities being manufactured, the company offers technical data relating to possible applications. Research and Development Div., Pennsylvania Salt Mfg. Co., 1000 Widener Bldg., Philadelphia 7, Pa.

Adhesives

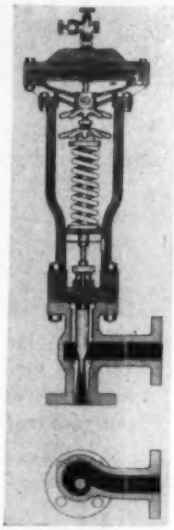
Case liner adhesives conforming to Joint Army and Navy Specification JAN-P-140 are being marketed under the trade name Flintkote No. 704. They are compounded for slow and fast tack range, as required in specification A and B grades. They can be used as seam sealers and closures for waterproof paper bags, wrap and case liners.

These adhesives meet all specifications for strength, mold and fungi resistance and water resistance in use with triplex creped or triplex and pleated barrier materials, and duplex uncreped, coated, saturated or asphalt infused sheets. Testing samples furnished on request. Flintkote Co., 30 Rockefeller Plaza, New York 20, N.Y.

Hydraulic Lift Truck

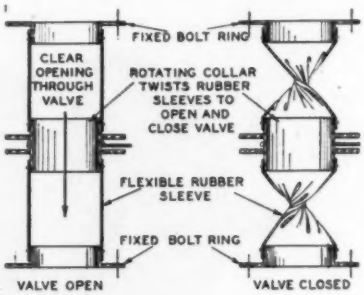
Marforge has named its new Load-Lift the "Lightning," and claims that it has greatly increased efficiency over all previous models. Made of aluminum, it has a "super-hydraulic" pump, developed in cooperation with Borg-Warner, which allows the hydraulic fluid to circulate by gravity from above the pump, rather than being sucked up from a separate tank underneath. The raising and lowering handle is also an innovation, for it can be operated with no stooping or bending. These advantages are due to the one-unit pump design, which can be purchased separately for any standard Load-Lift. Market Forge Co., Everett, Mass.

Flow Regulating Valves



Type V10 valves are designed to handle steam and water at high pressure drops, and especially flashing condensate. Uses include drainage for stage heaters, evaporator coils, flash tanks, process systems, sub-cooled heaters, boiler blowdown, feed pump recirculation and other severe service conditions where high-velocity impingement causes frequent maintenance or complete valve replacement.

An unusually long guide sleeve, made of precision ground stainless steel, and expanding outlet passage beyond orifice assure orderly discharge characteristics and freedom from turbulence or noise. Supplied in seven pipe sizes ranging from 1 to 4 inches. All sizes in 150 to 600 psi standards; some in 900-1500 and 2500 psi standards. Swartwout Co., 18511 Euclid Ave., Cleveland 12, O.



Bin Valves

The "Twistite" self-opening bin valves are closed by rotating a center collar. Flexible rubber sleeves then twist and prevent leakage through or from the valve, and wrap tightly around any lumps trapped within the valve to prevent leakage from the bin above.

The "Twistite" can be hand controlled locally by mounting a ratchet lock on the valve to hold the collar control cable in position. Remote hand control can be easily obtained by a simple pulley arrangement; or automatic control is possible by the use of a small actuating motor. The standard 6-in. valve weighs 35 lb. It will handle lump sizes up to 2½ in. and requires a 30-lb. cable pull for closure. Other sizes are available on request. Stephens-Adamson Mfg. Co., Aurora, Ill.

Doctor Blades Stay Sharper... Longer because of ROGERS Series 220 Knife Grinder

Yes, doctor blades .... *and all other straight knives* .... need the precision maintenance a sturdy Rogers series 220 knife grinder can give them. Its 7 tons provides a vibration-free movement to the knife table as it glides over extra wide, friction free, machined ways. Table speeds from 45 to 75 fpm provide for rough and finish grind,—and, so, preserve the life of your knife. The cool, segmental grinding wheel plus automatic coolant system safeguard the temper of your most expensive knives. Yes, these features, and many others, developed through over 63 years of grinding experience will give you *sharper* knives that stay sharp *longer*. Write today for further information.

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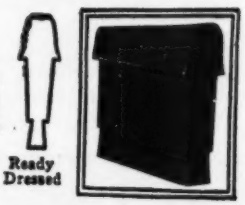

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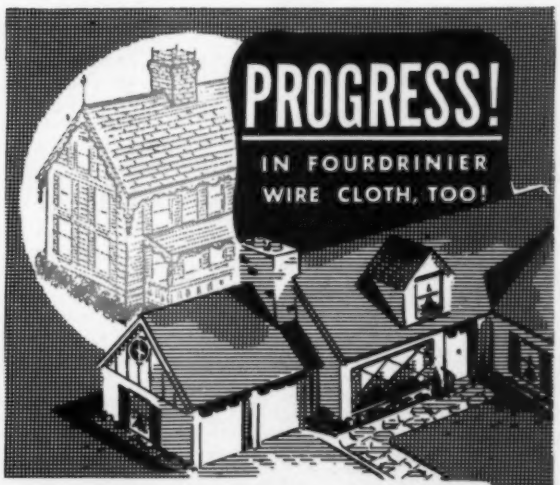

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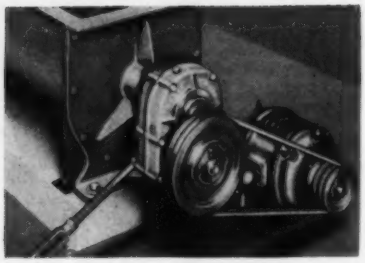
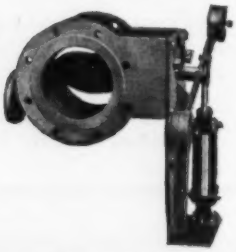


Torque-Arm Reducer

This single reduction unit is said to be the first shaft-mounted reducer designed for output speed ranges from 115 to 330 rpm. The shaft mounting feature eliminates special engineering, extra costs, and the operation of lining up.

In installation, the unit is locked to the shaft by means of two steel locking collars, one on each side of the reducer. It is anchored to the floor, or any other fixed object, by the torque-arm.

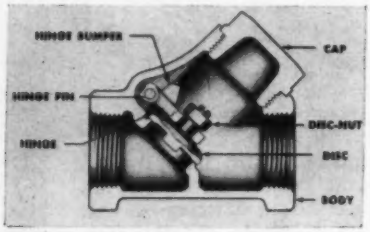
Four sizes are available, covering capacities up to 27 hp. Dodge Mfg. Corp., Mishawaka, Ind.



Off Center Relief Valve

R-S valve No. 780, illustrated, is one of a series of off center valves of the disc type recently developed to simplify the control of 15 psig saturated steam with a low pressure drop. A 2-inch flanged outlet provides overload relief.

These valves are also used in air, gas, liquid and semi-solid service for the control and shut off of volume and pressure. Available in a wide range of sizes and for higher pressures. R-S Products Corp., 4600 Germantown Ave., Philadelphia 44, Pa.



Regrinding Valves

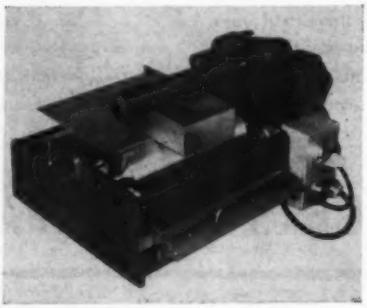
Y-pattern brass swing check valves are announced in a new design that permits regrinding and features many other improvements. A large cap opening on the same center line as the seat opening permits easy access for regrinding or replacement of parts. Easy contours in the body offer minimum resistance to flow. Closure on backflow is fast and positive.

The new valves are in the 200 and 300-lb. pressure classes. Screwed end patterns are available in sizes ¼ to 3 in., inclusive; flanged end patterns in sizes 1 to 3 in., inclusive. Crane Co., 836 S. Michigan Ave., Chicago 5, Ill.

Angle Sight Feed Valves

A supplement to Oil-Rite's straight sight feed valves (Style SFN) is a newly developed line of angle sight feed valves for pressure or gravity oiling systems, permitting a manufacturer to construct his own oiling system at low cost. These valves have extremely free-flow characteristics and allow the flow of oil to be visually checked and closely regulated.

They can be used singly (Style SFG) or gang mounted (Style SFM). An exclusive method of gang-mounting the valves is used, assuring a leakproof and compact design. They are very light in weight because of aluminum-alloy bodies. Low pressure drop and large orifices make these valves extremely dependable, it is claimed. Oil-Rite Corp., 3495 S. 13th St., Milwaukee 15, Wis.



Platform Box Gluer

A coating of adhesive can be applied to platform style boxes up to 3 inches high in two operations with this new gluer. The box section is fed through the gluer, which applies an even coating of adhesive over the entire surface. The operator then places the glued piece on the platform.

Glue temperature and coating thicknesses are regulated automatically. Adhesive coverage is assured by a ductor roller that applies the right amount of glue over the entire area. Operation is by a 1/3 hp., 110 v. AC motor. Three sizes are available: 6, 8 and 12 inch widths. Potdevin Machine Co., 1285 38th St., Brooklyn, N.Y.

Clutch and Brake Unit

Accessibility and low maintenance are the primary features of a new combination air powered friction clutch and brake. Used on medium and heavy machinery, the unit makes maintenance of shoe and lining assemblies and other wearing parts a matter of minutes, since such work can be done without removing the unit from the machine.

Disc wear is virtually eliminated because linings are positively and automatically withdrawn from contact with discs by the basic actuating mechanism. Bearing wear is minimized by use of oversize bearings, which reduce bearing pressure per square inch. Finally, it is possible to operate the unit with little or no inventory of spare parts, since the manufacturer provides an exchange system for clutch and brake shoes. Power Presses, Inc., 615 Penton Bldg., Cleveland, O.

New Product Briefs . . .

▸ WRAPPING MACHINE—The Model E Morpac is a heavy-duty, air operated and electrically controlled machine which packages ream paper, pads, etc., in a dust-proof wrapper without the use of sealing tape. One operator feeding reams into the machine can wrap 900 to 1000 packages per hour. Lynch Corp., Toledo, Ohio.

▸ PRIMER—Totrust Instant Dry Primer is a rust inhibiting coating for metal which permits re-coating in from 10 to 30 minutes. All standard types of paint may be applied over it, as well as rubber base paints, vinyl coatings and spraying lacquers. Wilbur & Williams Co., Boston 35, Mass.

▸ VACUUM HOSE—A new accordion hose stretches from 6 ft. to 14½ ft. in length without tension, and recoils on release. For cleaning around corners, overhead or in hard-to-reach places without moving the vacuum. Available in 1½ in. inside diam. Pullman Sales Corp., Rm. 838, 581 Boylston St., Boston, Mass.

▸ ALLOY TUBING—Carpenter Alloys B and C have been developed for tubing and pipe to handle hydrochloric acid, sulphuric acid and many other oxidizing corrodents. Tubing is available in sizes from ⅝ in. through 4½ in., and pipe from ⅜ in. through 4 in. Carpenter Steel Co., Alloy Tube Div., Union, N.J.

▸ LUBE CART—A two-wheeled Lube Service Cart, completely self-contained, dispenses grease and oil at high pressure, and also features removable equipment for remotely located bearings. Two models hold from 30 to 40 lb. of grease, as well as 2 qt. of oil. Gray Co., Inc., 200 Graco Sq., Minneapolis 13, Minn.

▸ COTTON TRUCK—A three-in-one unit for the Model LT-40 lift truck is used as a carriage for a cotton bale stacker, hydraulic bale clamp, or standard forks. The unit is expressly engineered for easy maneuvering in box cars. Attachments are quickly interchangeable. Towmotor Corp., 1226 E. 152nd St., Cleveland 10, Ohio.

▸ ENCLOSED MOTOR—A new improvement on the "Slo-Speed" geared motors is the totally enclosed "Klosd-Tite" construction for atmospheres containing non-explosive dusts, vapors and foreign materials. An external fan forces cooling air over the streamlined case. Sterling Electric Motors, Inc., Los Angeles, Calif.

▸ DOUBLE-CUT FILES—All models of Disston files are now available with double-cut staggered teeth, providing a cutting rather than scraping action of the file. Single-cut files will still be available for smooth precision work. Henry Disston & Sons, Inc., Philadelphia, Pa.

▸ ELECTRIC TACHOMETER—An inexpensive electric tachometer operates at distances up to 300 ft. from variable speed transmissions which must be mounted in remote locations. It runs on the AC generator principle, and is used on drives with capacities from ¼ to 87 hp. Reeves Pulley Co., Columbus, Ind.

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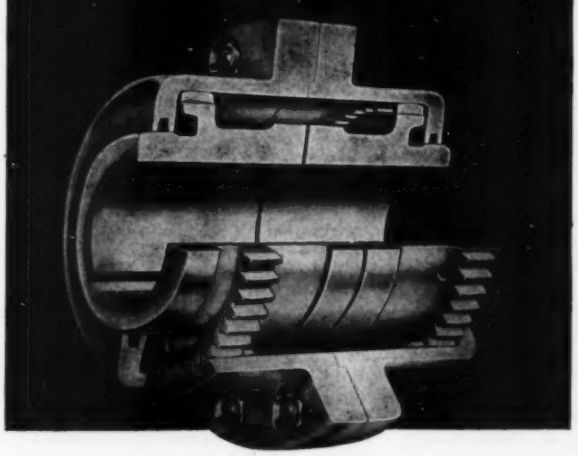

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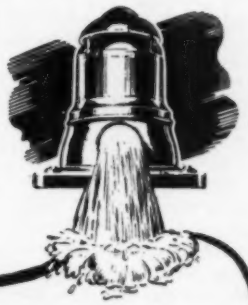

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Books

RATING EMPLOYEE AND SUPERVISORY PERFORMANCE, compiled by M. Joseph Dooher and Vivienne Marquis. Published by American Management Association, Publication Service Department, 330 West 42nd St., New York 18, N. Y. Paperbound. 192 pages. 8½x5½. $3.75.

This volume brings together in one publication a great deal of the better merit rating material published by the Association during the past several years. Additionally, the book presents a special section prepared from material resulting from original AMA research.

The purpose of this book is to bring to those in management and supervisory positions the tools necessary to allow objective judgments to be made of employee performances. Twenty-six examples of actual rating charts which are currently being used in industry are reproduced, with instruction as to their adaptation for use in various jobs and businesses. For those firms or individuals which have not as yet instituted employee rating systems, this publication offers basic background information necessary for installation of such a program; if nothing more, this book would help such firms or individuals decide upon the worth of employee rating systems in their individual cases.

The book is arranged in six sections—Basic Principles and Techniques of Merit Rating, Toward More Scientific Rating, Special Adaptations of Merit Rating, Company Case Histories, Applying the Results of Merit Rating, and The Rating Form. Sixteen chapers, representing the work of fourteen management authorities, and an appendix are contained in these six sections. All major rating systems now in common use are reviewed; those applicable to white-collar and professional workers as we!l as to the industrial employee.

The editors suggest that this publication will be found an excellent companion to the AMA's HANDBOOK OF WAGE AND SALARY ADMINISTRATION.

PRESIDENT'S WATER RESOURCES POLICY COMMISSION REPORT. Published by Superintendent of Documents, Washington 25, D. C. Volume 1, A WATER POLICY FOR THE AMERICAN PEOPLE, $3.25. Volume 2, TEN RIVERS IN AMERICA'S FUTURE, $6.00; various separate sections of Volume 2 concerning specific rivers may be obtained for prices varying from 50c to $1.00. Volume 3, WATER RESOURCES LAW, $2.25.

The Commission's main report, Volume 1, offers a co-ordinated national program which is recommended for the development of water resources, together with specific suggestions on policy.

Volume 2 is a study of ten river basins in different parts of the United States. A detailed discussion of the problems of each basin is available separately from the others of the series. These booklets concern the Columbia, Missouri, Rio Grande, Colorado, Connecticut, Alabama-Coosa, Potomac, Ohio and Tennessee Rivers, and the Central Valley of California.

"Water Resources Law," Volume 3, summarizes existing Federal Law as it concerns the water resources of the nation.

STATISTICAL ENGINEERING IN THE CHEMICAL PROCESS INDUSTRIES. By James R. Thomen. Published by Chemonomics, Inc., 400 Madison Ave., New York 17, N. Y. 48 pages. Lithoprint, paperbound. $2.00.

This monograph, the first of a series of collected abstracts of articles discussing and describing the application of statistical engineering methods in the process industries, is edited by Dr. David B. Hertz and Dr. Sebastian B. Littauer of the Statistical Engineering Division of R. S. Aries and Associates.

Abstracted articles are included which deal with quality, experimentation, production control, reproducibility studies, design of experiments, determination of specifications, studies of batch processes, analytical determinations, testing procedures, etc. The publishers state that several of the articles included use the pulp and paper industry as their illustrative industry; one such abstract is concerned with the control of paper quality.

THE AMA HANDBOOK OF WAGE AND SALARY ADMINISTRATION, Tested Compensation Methods for Factory, Office and Managerial Personnel. Edited by M. Joseph Dooher and Vivienne Marquis. Published by American Management Association, 330 West 42nd St., New York 18, N. Y. 416 pages. 9½x6¼. $7.50; 5.00 to AMA members.

This book, a companion release to the AMA's RATING EMPLOYEE AND SUPERVISORY PERFORMANCE, is a guide to the principles and techniques of wage and salary administration. An integrated compilation of the best wage and salary administration material as yet published by the Association, the volume includes work by leading wage and salary authorities.

Twenty-four leading industrial and educational experts have contributed to the thirty-four chapters of this book. The chapters are indexed into ten parts: Basic Principles and Approaches in Wage and Salary Administration, Conducting the Wage Survey, Case Histories in Wage and Salary Administration, Effective Compensation Methods for Salaried Jobs, Supervisory and Executive Salary Administration, Special Adaptations, Operating Problems, Keeping the Plan Up to Date, Selected Forms for Job Evaluation, and Simplifying Wage and Salary Programs.

Case histories are included to show possible adaptations of systems used to the special problems in large or small organization; the appendix is a reproduction of the manual used by Armstrong Cork Co. to explain wage scales to employees. The chapter entitled Selected Forms for Job Evaluation not only illustrates forms now in use in industry, but suggests how they may be modified for specific varying uses, and how management may determine modifications for any company's use. A bibliography of important works in the field of wage and salary administration is included, and the volume is well cross-indexed.

Booklets and Pamphlets

OFFIZIELLER DRUPA KATALOG. Published by DRUPA, Internationale Messe fur Druck und Papier, Nordwestdeutsche Ausstellungs-Gesellschaft, Duesseldorf, Germany. This, the official catalogue of the DRUPA exhibition, is now available from Duesseldorf headquarters.

GROWING AND HARVESTING TREE CROPS, a pulpwood booklet. Published by West Virginia Pulp and Paper Co., New York 17, N. Y. 74 pages. 9 x 6. This profusely illustrated booklet offers four sections of certain value to the pulpwood farmer—"The Market for Pulpwood," "Tested Methods for Cutting and Handling Pulpwood," "Business Pointers for Landowners and Producers," and "Growing Trees for Future Income." This publication brings up to date pulpwood procedures and information presented in earlier West Virginia P&P booklets, and is complete with a thorough cross index.

PLANNED MAINTENANCE. Published by Wallace Clark & Co., Inc., 521 Fifth Ave., New York 17, N. Y. 11 x 8½. 13 pages. Free. This booklet, consisting of reprints of six articles on maintenance written by Wallace Clark & Co. engineers for publication in recent issues of THE PAPER INDUSTRY, describes how application of Wallace Clark principles in paper mills may result in reduced equipment downtime, more output per mechanic, assurance that

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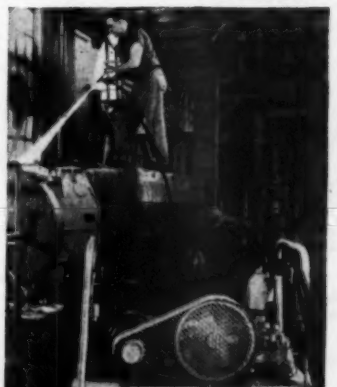

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the proper number of mechanics are retained, better co-operation between maintenance and operating personnel, and reduced investment in replacement parts. The six articles included are: "Maintenance Organization for a Paper Mill" (P.I., May, 1950), "How to Plan Paper Mill Maintenance" (P.I., June, 1950), "Maintenance Work Load" (P.I., July, 1950), "Preventative Maintenance Pays Dividends" (P.I., October, 1950), and "How to Set Up a Maintenance Stores Department" (P.I., December, 1950).

DESCRIPTIVE COLOR NAMES DICTIONARY. Published by Container Corporation of America, 38 So. Dearborn St., Chicago 3, 64 pages. This dictionary is published as a supplement to Container Corporation's Color Harmony Manual; containing 775 color names so arranged that the user can work from names to colors or colors to names, the Dictionary will be particularly helpful to newspaper and catalogue advertisers who need to describe colors of merchandise pictured in black and white.

STATISTICAL ENGINEERING IN THE CHEMICAL PROCESS INDUSTRIES, abstract of selected articles, series 1. Published by Chemonomics, Inc., 400 Madison Avenue, New York 17, N. Y. This booklet, edited by James R. Thomsen of the Statistical Engineering Division of R. S. Aries & Associates, includes 51 outlines of articles concerning modern statistics in chemical industries; five of the abstracts included concern the pulp and paper industry directly, and numerous others are applicable to it.

Manufacturers' Publications

Through the co-operation of manufacturers and suppliers, THE PAPER INDUSTRY *lists the following catalogues, bulletins and booklets. They may be obtained without cost or obligation, unless otherwise specified, by writing direct to the manufacturers. Please address requests on your company letterhead.*

Magnetic Separator. Eriez Mfg. Co., Erie, Pa.—Bulletin 702 has been released to explain the Magnetic Hump, designed to remove tramp iron from materials conveyed in pneumatic, gravity flow or liquid lines. Included are construction and application data, information on the proper selection of a magnetic separator and engineering diagrams.

Rust Solvent. Haas Miller Corp., 4th & Bristol Sts., Philadelphia 40, Pa.—"Immunol," 12 pages, describes a water-soluble rust preventive and rust solvent. Used in water, it immunizes metal from rust. Its extreme solvent properties are described, and other advantages are clearly brought out.

Ash Handling Systems. Beaumont Birch Co., 1505 Race St., Philadelphia 2, Pa.—This 24-page booklet gives answers to questions on hydraulic and pneumatic ash and flyash handling systems. It discusses the elements of various systems and gives various disposal schemes. Diagrams and drawings show details.

Protective Paints. David E. Long Corp., 220 E. 42nd St., New York 17, N.Y.—A 4-page booklet and separate price list give data on all types of D E L primers and coatings for metal and masonry in industrial applications. Quick drying and high resistance to film of all kinds are features described in detail.

Lift Truck Attachment. Towmotor Corp., 1226 E. 152nd St., Cleveland 10, O.—Accessory Data Sheet No. AD-10 shows the revolving carriage now available for fork lift trucks. The carriage rotates 360 degrees in either direction in a smooth, powerful motion. Complete specifications of all sizes are given.

Knife Grinder. Hanchett Mfg. Co., Big Rapids, Mich.—Bulletin 175-11 covers all specifications of the Type AK traveling wheel knife and shear blade grinders. Five models are listed, and the traveling carriage unit is featured.

Precipitating Softener. Worthington Pump and Machinery Corp., Harrison, N.J.—Bulletin W-212-B6 describes the Type CM precipitating softener and coagulator, in which energy for floc preparation is mechanical. This supplements Bulletin W-212-B5, which describes the hydraulically motivated system and the elementary theory of softening. The new bulletin describes the flow circuit and suggests a system appraisal.

Water Cooling Systems.—Schutte and Koerting Co., Dept. J-D, Cornwells Heights, Bucks County, Pa.—8-page bulletin details design and operation of SK spray nozzles, and diagrams typical spray pond arrangements. Also described are SK louvre screens to prevent spray from being carried away by wind.

Pallet Truck. Towmotor Corp., 1226 E. 152nd St., Cleveland 10, O.—An 18-page color booklet shows every detail of the new and improved Model "W" electric pallet truck, for handling loads up to 4000 lbs. Booklet is titled "An Engineering Achievement."

Speed Recorders. Leeds & Northrup Co., 4934 Stenton Ave., Philadelphia 44, Pa.—A revised 20-page edition of the speed recorder catalogue, No. N-27, evaluates increased production efficiency in the paper industry, among others, by the use of various types of Micromax and Speedomax instruments. A completely new line of tachometers is featured.

Straddle Trucks. Hyster Co., Portland, Ore.; Peoria, Ill.; and Danville, Ill.—Form 1164, 16 pages, covers many uses of the Hyster straddle truck, including lumber carrying, for which it was originally designed. Construction details are pictured and tables of specifications for three models are given.

Linings. Atlas Mineral Products Co., 42 Walnut St., Mertztown, Pa.—Corrosion Proof Linings Bulletin No. 4-1 describes a complete line of corrosion proof linings, including sheet linings, solution or dispersion linings and brick sheathings.

Water Demineralizers. Penfield Mfg. Co., Inc., 19 High School Ave., Meriden, Conn.—A folio contains 8 catalogue sheets on Penfield systems ranging in capacity from 30 to 1000 gallons per hour. A prospective user may quickly figure the chemical costs of operating any model under his own raw water conditions, by referring to the proper figure in the "Performance Chart" given for each model.

Midget Substation. General Electric, Schenectady 5, N.Y.—8-page Bulletin GEA-5571 explains the Inductrol Power Pack, a low-voltage AC lighting and power unit, incorporating in one housing an air circuit breaker, a dry-type transformer and an air-cooled induction regulator. Single phase and three phase regulating units are covered.

Air Motors. Bellows Co., Akron, O.—Bulletin CL-30 is a 24-page introduction to the use of air power in many applications. Various pieces of equipment are shown powered with air motors, and performance records are given. An exceptionally interesting presentation.

Packings. Greene, Tweed & Co., North Wales, Pa.—Catalogue PC-101, 20 pages, brings together all material on Palmetto packings previously made available in separate product bulletin sheets, and includes data on new items. All applications of Palmetto packings are covered.

Truck Batteries. Gould-National Batteries, Inc., Trenton 7, N.J.—Nine data sheets specify the batteries to be used with the following makes of "walkie" trucks: Automatic, Barrett-Cravens, Lyon-Raymond, Market-Forge, Moto-Truc, Revolvator, Stuebing, Towmotor and Yale & Towne. Each sheet recommends battery types for light, normal and heavy duty.

Universal Joints. Curtis Universal Joint Co., Inc., Springfield, Mass.—The 1951 Curtis catalogue, 4 pages, gives illustrated general data on the use of Curtis universal joints, and tables of specifications on all types manufactured by this company. The new "Lo-Friction" type is featured.

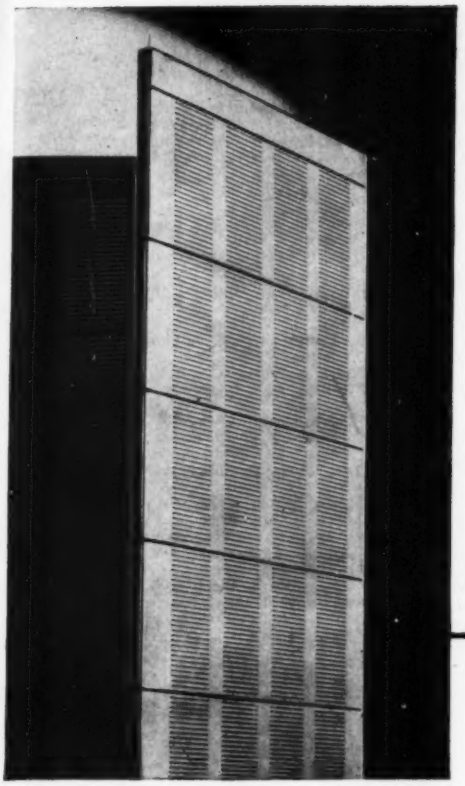
Cranes. Thew Shovel Co., Lorain, O.—A 12-page bulletin covers the application of Lorain shovels and cranes to the logging, pulpwood and lumber industries. It consists entirely of job stories and photographs of equipment.

Fire Extinguisher. American - LaFrance - Foamite Corp., Elmira, N.Y.—4-page bulletin describes the new Alfco Model 350, a portable dry chemical engine with 350-lb. capacity, for fires of B and C classification. Operation is fully described and illustrated.

Miniature Speed Changers. Metron Instrument Co., 432 Lincoln St., Denver 9, Colo.—A 4-page bulletin, No. 100 (Revised), describes a line of low power fixed ratio speed changers for installations that require small-size instruments. Ratios and special features such as zero backlash are described.

Transmission Belting. Thermoid Co., Trenton, N.J.—An 8-page bulletin, No. 3678, gives concise information on flat transmission belting. It contains complete formulae, tables and charts for the proper selection of transmission belting.

Chlorinizer. Builders-Providence, Inc., Providence, R.I.—4-page Bulletin 840-G27 is on the new high capacity Model HCVS Volumetric Chlorinizer, which is designed to meter chlorine gas accurately at rates from 100 to 6000 lb. per 24 hours. Complete information, including diagram and photographs, is given.



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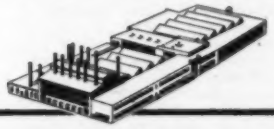

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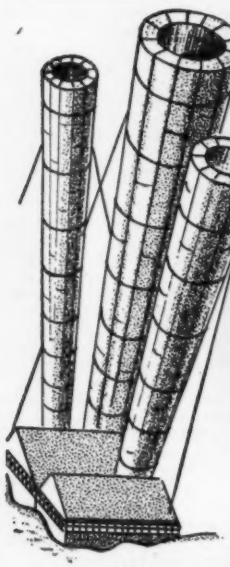

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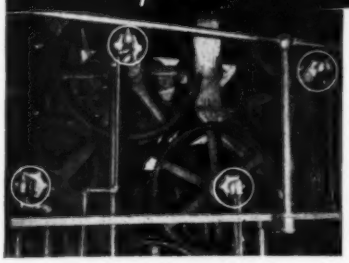

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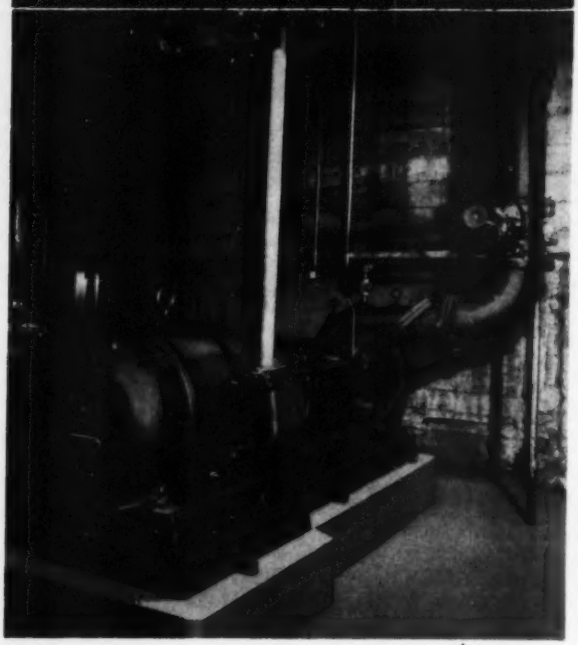

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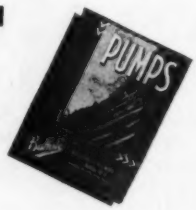

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Quotations to consuming mills, cents per pound or dollars per hundred pounds, f.o.b. New York, follow:

	per cwt.
Blue Overalls	16.50 to 17.00
Corduroy, Men's	5.75 to 6.00
Corduroy, Ladies'	5.75 to 6.00
Washables, No. 1	6.00 to 6.50
Percales	14.50 to 15.00
Light Prints, No. 1	13.50 to 14.00
Khaki Cuttings—	
Bleachable	11.50 to 12.00
Unbleachable	10.00 to 10.50
New White Canvas	24.00 to 25.00
Canton Flannels, bleached	24.50 to 25.50
Canton Flannels, unbleached	24.00 to 25.00
Shirt Cuttings—	
New White No. 1	24.50 to 25.50
White Shrunk	22.00 to 23.00
Silesias No. 1	15.00 to 15.50
New Unbleached	25.00 to 26.00
Fancy	11.00 to 11.50
Linen Cuttings—	
American	15.00 to 16.00
White	26.00 to 27.00
Grey	25.50 to 26.50

RAGS (Domestic)

OLD RAGS

Quotations to consuming mills, dollars per hundred pounds, f.o.b. New York, follow:

	per cwt.
Roofing—	
No. 1	2.70 to 2.85
No. 2	2.60 to 2.75
No. 3 and 4	2.40 to 2.65
Twos and Blues—	
Repacked	5.00 to 5.50
Thirds and Blues—	
Repacked	4.75 to 5.00
Miscellaneous	4.00 to 4.25
Whites, No. 1—	
Repacked	6.50 to 7.00
Miscellaneous	5.00 to 5.50
White, No. 2—	
Repacked	5.00 to 5.50
Miscellaneous	4.25 to 4.75

RAGS (Foreign)

ex dock New York City

NEW RAGS

	per cwt.
New Dark Cuttings	Nominal
New Mixed Cuttings	
New Light Silesias	
Light Flannelettes	
Unbleached Cuttings	
New White Cuttings	
New Light Oxfords	
New Light Prints	

RAGS (Foreign)

ex dock New York City

OLD RAGS

	per cwt.
No. 1 White Linens	Nominal
No. 2 White Linens	
No. 3 White Linens	
No. 4 White Linens	
No. 1 White Cottons	
No. 2 White Cottons	
No. 3 White Cottons	
No. 4 White Cottons	
Extra Light Prints	
Ord. Light Prints	
Med. Light Prints	
Dutch Blue Cottons	
French Blue Cottons	
French Blue Linens	
Checks and Blues	
Linsey Garments	
Dark Cottons	
Old Shopperies	

ROPE and BAGGING

f.o.b. and ex dock New York City

	per cwt.
Gunny No. 1—	
Foreign	8.50 to 9.00
Domestic	8.50 to 9.00
Wool Tares—	
Light	9.50 to 10.00
Heavy	10.00 to 11.00
No. 1 Scrap Bagging	7.50 to 8.00
Manila Rope—	
No. 1 large	6.50 to 7.00
No. 1 small	5.50 to 6.00
Sisal Rope—	
No. 1 large	6.00 to 6.50
No. 1 small	5.50 to 6.00
New Burlap Cuttings	9.00 to 10.00
Jute Threads—	
Foreign (Nom.)	7.50 to 8.00
Domestic	7.50 to 8.00
Strings—	
No. 1 sisal	5.50 to 5.75
No. 2 sisal	5.00 to 5.25
Soft jute	5.25 to 5.50
Mixed	3.50 to 3.75

WASTE PAPER

The following are quotations, dollars per ton, for No. 1 packing f.o.b. New York:

	per ton
Shavings—	
Hard White Env. Cuts	225.00—
Hard White, No. 1	200.00—
Soft White, No. 1	175.00—
Soft White, one-cut	190.00—
Soft White, Misc.	150.00—
Fly Leaf, No. 1	95.00—
Fly Leaf, Woody No. 1	70.00—
No. 2 Mixed Col. Woody	60.00—
Flat Stock—	
No. 1 Heavy Books and Magazines, Repacked	60.00—
Mixed Books	35.00—
Ledger Stock—	
No. 1 White	125.00—
No. 1 Mixed (Colored)	100.00—
Manilas—	
New Env. Cuttings	135.00—
New Env. Cuts, One-Cut	—
Extra Manilas	85.00—
Manila Tab Cards, Free of Ground Wood	150.00—
Colored Manila Tab Cards	115.00—
Kraft—	
New Envelope Cuttings	160.00—
Tripled Sorted No. 1 100%	110.00—
No. 1 Old Assorted	85.00—
News—	
White Blank	125.00—
Overissue	40.00—
No. 1 Folded	35.00—
Old Corrugated Container	53.00—
New Jute Corrugated Cuts	60.00—
Mill Wrappers	32.50—
Box Board Chips	30.00—
No. 1 Mixed Paper	30.00—

CHEMICALS

f.o.b. shipping point

Alum (Papermakers)—	
Lump, cwt.	4.05—
Ground, cwt.	3.80—
Powdered, cwt.	4.20—
Blanc Fixe—	
Pulp, bulk, ton	90.00—
Dry, barrels	95.00—
Bleaching Powder—	
Drums, cwt.	5.00 to 6.00
Casein (Domestic Standard)	
20-30 mesh (bags), lb.	
80-100 mesh (bags), lb.	42.00 to 43.00
Argentine, lb.	38.00 to 38.50
China Clay—	
Domestic Filler Bulk (mine) ton	10.00 to 15.00
Domestic Coating Bulk (mine) ton	15.00 to 25.00
Imported (ship side) Bulk (lump) ton	22.00 to 30.00
Chlorine—	
Tank cars (wks) cwt.	2.80 to 3.05
Gelatine (silicin), lb.	1.25 to 1.35
Glyc. (C.P.) drums, lb.	.50 to .55
Litharge, powd. bbl. lb.	.18¾ to .20

Rosin (Gum)—	New York, per 100 lbs.
E	9.75—
F	9.75—
G	9.75—
WW	10.75—
Rosin (Wood), carlots,	
F.O.B. South	7.50—

MARKET QUOTATIONS

Salt Cake—
Dom. bulk (wks) ton..... 22.00 to 24.00
Imp. bulks on dock—
(Atl. ports) ton (Nom.) 25.00—

Soda Ash—
Bulk (works) cwt..... 1.20—
Paper bags, cwt..... 1.50—

Soda (Caustic)—
Solid drums, cwt..... 3.35 to 3.40
Ground and flake, drums, cwt. ..... 3.75 to 3.85

Sodium Silicate—
60 deg. 55 gal. drums, (works) cwt. ..... 1.80 to 1.90
40 deg. 35 gal. drums, (works), cwt. ..... 1.50 to 1.60

Starch—
Pearl, 140 lb. bags, cwt... 6.09—
Pearl, barrels, cwt..... 6.09—
Paper (8p.) bags, cwt.... 6.09—
Powdered, barrels, cwt... 6.32—

Sulphur (Crude)
(Mine) bulk, long ton.... 22.00—

Talc—
Dom. 100 lb. bags (mine) ton ..... 25.00 to 28.00
Canadian ..... 35.00 to 45.00

Titanium Dioxide—
Barium Pig, bbls., lb..... .21 to .21½
Calcium Pig, bbls., lb..... .21 to .21½
Zinc Sulphide, bbls., lb..... 11.50 to 11.75

WOOD PULP

Prices, dollars per short, air dry, ton, with inland freight allowed, are:

Bleached sulphite, Swed... —
Bleached sulphite, Finn.....225.00—
Bleached sulphite, Can.....160.00—
Bleached sulphite, dom.....135.00—
Easy bleaching sulphite..... —
Unbleached kraft, Finn.....200.00—
Unbleached sulphite, Swed. —
Unbleached sulphite, Finn. —
Unbleached Sulphite, Can.142.50—
Unbleached kraft, Swed..... —
Unbleached kraft, Finn.....200.00—
Unbleached kraft, Can.....145.00—
Unbleached kraft, northern 140.00—
Unbleached kraft, southern 140.00—
Bleached sulphate, Swed... —
Bleached sulphate, Can.....185.00—
Bleached soda, Canadian..155.00—
Bleached soda, domestic.....140.00—
Sulphite screenings, dom... 40.00 to 50.00
Groundwood, domestic..... 85.00 to 100.00
Groundwood, Canadian..... 95.00—

PAPER

f.o.b. New York City

Boards— per ton
Binders .....140.00—
Chip .....105.00—
Chip, tube and can.....115.00—
Chip, full blending.....117.50—
Chip, sgl. mla. lined.....130.00—
Coated, white patent
.016 .....175.00 to 185.00
.020 and heavier.....165.00 to 175.00
Kraft liner .....125.00—
Filled News .....107.50 to 110.00
Container .....130.00—

Book Papers—f.o.b. mill with quantity, weight, manufacturing and other differentials allowed:

(Per cwt. in ton lots)
Uncoated (Untrimmed)

Book, White (M. F.)—
A Grade E. F..... 17.40—
B Grade E. F..... 17.65—
A Grade S. C..... 18.15—
B Grade S. C..... 18.40—
No. 2 Uncoated Offset 4 sides, White..... —

Machine Coated White
No. 1 Glossy..... 23.40—
No. 2 Glossy..... 21.90—
No. 3 Glossy..... 21.15—
No. 4 Glossy..... —
No. 2 Offset..... 17.90—
CIS Litho (Varnish)..... —
CIS Litho (Non-Varnish) —

Writing Papers—f.o.b. mill with zone, quantity, packing and other differentials allowed:

Rag Content Bond—
(In Ton Lots)
per cwt.
Extra 100% Rag..... 70.45—
100% Rag..... 62.45—
75% Rag..... 48.15—
50% Rag..... 38.90—
25% Rag..... 31.65—

Rag Content Ledger—
(In Ton Lots)
per cwt.
Extra 100% Rag..... 72.65—
100% Rag..... 63.90—
75% Rag..... 49.40—
50% Rag..... 40.20—
25% Rag..... 33.00—

Sulphite Bond—
per cwt.
Air dry, watermarked..... —
No. 1 watermarked..... 19.05—
No. 2 watermarked..... 18.10—
No. 4 watermarked..... 17.10—

Sulphite Ledger—
per cwt.
No. 1 watermarked..... 21.15—
No. 2 watermarked..... 21.00—
No. 4 watermarked..... 20.40—

Glassine (f.o.b. mill)—
per cwt.
Embossed (25 lb. up) ..... —
Bleached (25 lb. up)..... —
Unbleached (25 lb. up).. —

Greaseproof—
Bleached (25 lb. up).... —
Unbleached (25 lb. up) —

News—
per ton
Rolls, Standard (Contract) .....106.00 to 110.00
Rolls (Spot)..... (Nominal)
Sheets ..... —

Tissues (Carlots)—
per ream
White No. 1..... 1.95—
White No. 2..... 1.85—
Bleached Anti-Tarnish.... —
Colored ..... —
Anti-Tarnish Kraft..... 1.85—
Manila ..... 1.95—
Napkins, semi-crepe (12½ lb. to M shts.) per cs..... .90—
Napkins, full crepe and embossed (12½ lb. to M shts.) per cs..... .90—
Toilet, Bleached (M shts.) per cs..... 7.10—
Toilet, Unbleached (M shts.) per cs..... 6.60—

Towels
per case
Bleached ..... 6.65—
Unbleached ..... 5.65—

Wrappings (Kraft)—
per cwt.
Super-Standard ..... 9.25 to 9.50
No. 1 Wrapping..... 8.25 to 8.50
Standard Wrapping..... 7.75 to 8.00
Standard Bag..... 7.50 to 7.75
Variety Bag..... —

Wrappings (Sulphite and Bleached Kraft)—
(Rolls, f.o.b. mill)

Bleached Papers—
per cwt.
M.F. & M.G. Waxing, 20 lb. (carloads only) — —
(10,000 lb.)..... —
Drug wrapp., 35 lb... —

Unbleached Papers
Com. Gr. Butch. 40 lb.
No. 1 Butchers..... —
No. 1 Imit. Parch. & Dry Fin. Groc. Sulphite, 30 lb..... —
No. 2 Imit. Parch. & Dry Fin. Groc. Sulphite, 30 lb..... —
Steam Finish, 50 lb... —
Water Finish, 50 lb... —

Manilas—
Envp. Mla., Sub. 16-40 (No. 1)..... —
Env. Mla., Sub. 16-28 (No. 2)..... —
Envp. Mla. (Prices based on large sheets untrimmed ream marked, in bdls.)..... —

Wrapp. Mla. 35 lb. up—
No. 1..... 9.00—
No. 2..... —

M.G. Sulphite and Kraft (other than Waxing)
Grade B-20 lb..... —
Grade A-22 lb..... —

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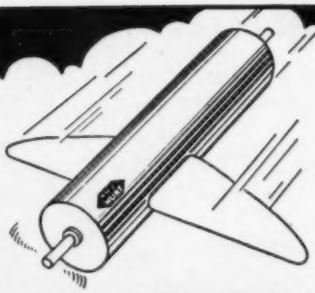

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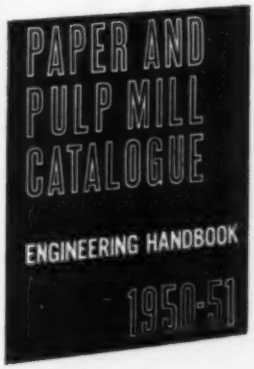

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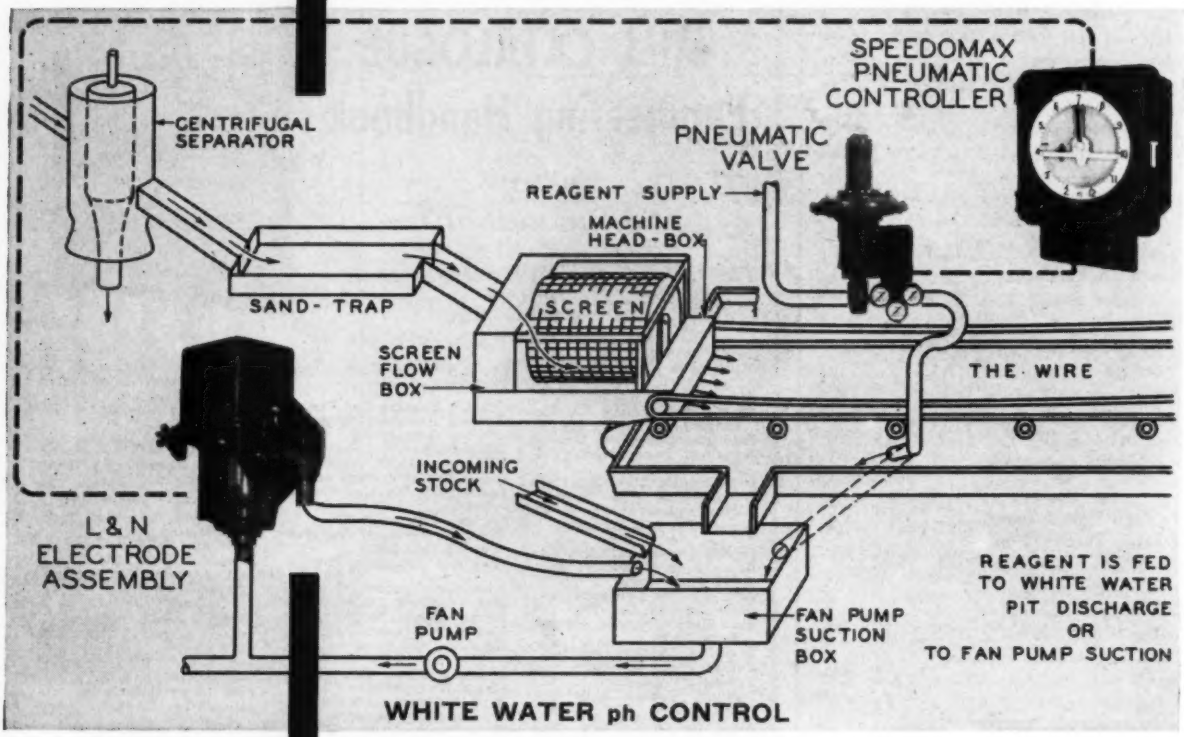

With today's trend to form the sheet at higher pH values, an automatic control instrument of unusually high sensitivity and accuracy to regulate the critical pH of the furnish pays big dividends. Speedomax Pneumatic Control answers these requirements with an electronic measuring circuit and air actuated control system which holds pH of Fourdrinier or cylinder machine stock or white water consistently within very close limits. Speedomax users on nearly 200 paper machines have reported some or all of the following benefits:

- **Increased production because sheet breakage is reduced**
- **Improved uniformity of stock in both color and strength**
- **Increased wire life because acid corrosion is reduced**
- **Reduced chemical consumption due to less over-treatment**

Speedomax Pneumatic Control senses how large the pH deviation is, how fast it develops and how long it lasts. The pneumatic system corrects for each of these changing factors. Also, wide range of adjustment of each control action enables the Speedomax Pneumatic Control to be tuned to any pH process and exert close regulation even in the highly critical neutral pH zone. For those who prefer the same actions in an all electric form, Speedomax P.A.T. 50 Control is available. For further information about either control, write Leeds & Northrup Co., 4974 Stenton Ave., Phila. 44, Penna.

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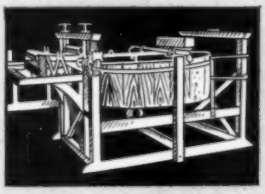
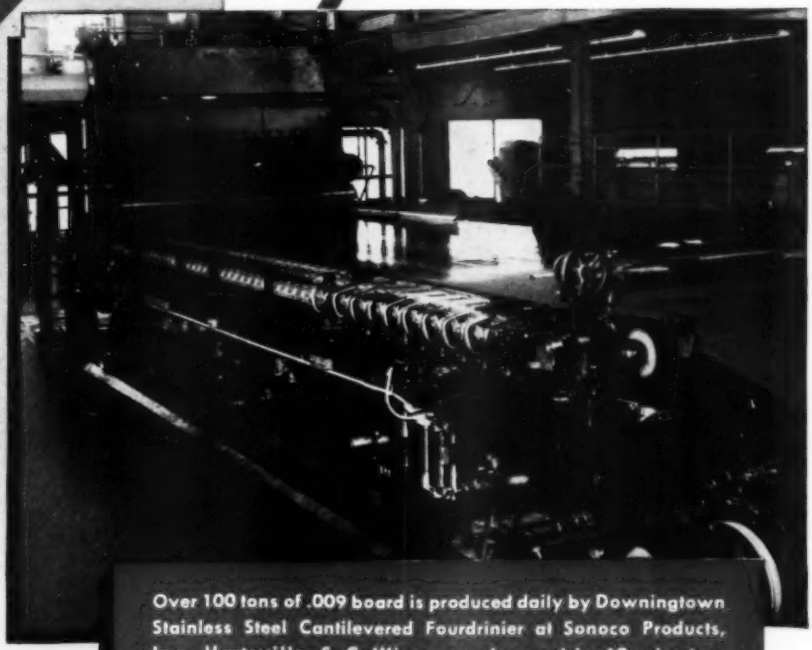
FOURDRINIER'S *Folly* COMES OF AGE

1804



THE DOWNINGTOWN STAINLESS STEEL CANTILEVERED FOURDRINIER REACHES NEW HIGHS IN DESIGN AND MATERIAL IMPROVEMENTS



Over 100 tons of .009 board is produced daily by Downingtown Stainless Steel Cantilevered Fourdrinier at Sonoco Products, Inc., Hartsville, S. C. Wires are changed in 40 minutes.

What sceptics once called "Fourdrinier's Folly", has reached its highest point of development in the new Downingtown Stainless Steel *Cantilevered* Fourdrinier, which is setting records for flexibility, production, low maintenance costs and short "down time" for wire changes.

Corrosion, an important cause of excess "down time" for repair and replacements, has been effectively taken care of through the extensive use of stainless steel. In the Downingtown Stainless Steel *Cantilevered* Fourdrinier this highly corrosion resistant metal is used in suction boxes, head box, distributing rolls, high and low head suction slices, tubular shake rails and savealls.

The many design improvements and speed range from 150 to 1500 FPM make this machine unusually versatile . . . able to handle wide varieties of stock at speeds best suited for maximum production.

Consult your Downingtown engineer now about designs and costs for installing this modern Fourdrinier or write for complete information.

More Downingtown FOURDRINIER FEATURES

- **Dual Suction Box Couch Roll**
- **Flow Spreader**
- **Multiple Passes**
- **Foam Shower**
- **Faster Wire Changing**
- **In-operation Level Adjustment**
- **Improved Shake Rails**
- **Balanced Wire Rolls**
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STAINLESS STEEL FOURDRINIER

High point in flexibility

DESIGNERS AND BUILDERS OF PAPER MAKING MACHINERY SINCE 1880

REDUCE
Your Stocks
SIMPLIFY
Maintenance

WITH

FIG. 2150
150 LBS. S.P.
DOUBLE WEDGE DISC
RISING STEM

LUNKENHEIMER INTERCHANGEABLE BRONZE VALVES

Threads and parts of the Fig. 2150 series are designed so that you can interchange bonnets and trim in seconds. Just spin the threads together, tighten, and your *converted* valve is ready for the toughest 150-lb. service.

This feature of simple conversion lets you *reduce* your valve inventory. Figure 2150 is a double-wedge disc, rising stem design. Figure 2151 has a solid wedge disc and rising stem. And Figure 2153 is a single wedge disc valve, of non-rising stem design. Bodies are the same for all three. With only a few valves in stock, you're ready to meet *any* maintenance problems, because you can interchange trim to suit the service . . . and provide new parts as you need them.

Avoid costly "downtime" by stocking Lunkenheimer 150-lb. bronze valves, available in sizes from ¼ in. to 3 in.

FIG. 2151
150 LBS. S.P.
SOLID WEDGE DISC
RISING STEM

Ask your distributor for Circular 574, describing the complete Fig. 2150 series, feature by feature. Or write The Lunkenheimer Co., Box 360S, Cincinnati 14, Ohio.

FIG. 2153
150 LBS. S.P.
SINGLE WEDGE DISC
NON-RISING STEM

BRONZE • IRON • STEEL

LUNKENHEIMER

THE ONE *Great* NAME IN VALVES

L-351-14